

The Role of Technology in Providing the Efficiency of Kitchen Design

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ABSTRACT

The Kitchen Concept has gone through very radical changes since its existence. At the beginning of the 20th century, it was only used by cooks and servants and what went on in the kitchen was not of any concern to the rest of the household occupants. As the meals were served in the dining room, the aesthetical aspect of the kitchen was not important. When servants were abolished, women resumed their duties in the kitchen. Technological advancements did not ease the chores that they had to perform but only added more on top of everything else. As women searched for jobs outside of the kitchen, the kitchen itself had evolved into a multifunctional space that was as important as the rest of the house in terms of aesthetics. Nowadays a lot of time and money is spent in the kitchen to make it more appealing to guests and owners alike. In today's kitchen, there are multiple solutions to increase efficiency around it to reduce the time spent for cleaning and cooking.

With the development of the kitchen industry, capability of creating a functional kitchen design is being greatly considered. Existence of issues such as lack of space and visual quality, in addition to the requirements for careful planning brings up the consideration for solution such as technology.

Technology, as an individual aspect in the design process, in addition to the fact that it is being constantly developed, it has its own effect on kitchen design, and its components. The aim of this study is to demonstrate the relationship between kitchen design and

technology by questioning the role of technology in the efficiency of kitchens through ergonomic comfort.

In this research, efficiency and physical comfort as well as ergonomic dimensions for kitchen design are investigated. Furthermore, the evolution of kitchens in relation to technology is studied. In the case study section, a number of companies are selected and analyzed in a variety of aspects including technology. This research is based on the qualitative methods that explore the benefits of technological improvements in kitchen designs and the interpretative research methods which is a type of qualitative research. It also includes quantitative research methods for determining the role of technology in international kitchen brands.

Keywords: kitchen design, Technology, Kitchen Cabinets, Home appliance, Kitchen Accessories, Efficiency

ÖZ

Varoluşundan bu yana mutfak kavramı birçok radikal değişikliklerden geçmiştir. 20'inci yüzyılın başında mutfak sadece aşçı ve hizmetçiler tarafından kullanılmış olup evin diğer sakinlerinin mutfakta neler olup bittiğine dair herhangi bir ilgi ve alakası yoktu. Aynı zamanda, yemek servisi yemek salonunda yapılmasından dolayı mutfağın estetiksel görünümü hiçbir zaman önemli olmamıştır. Yıllar sonra hizmetçiliğin ortadan kalkmasıyla kadınlar mutfak görevlerini üstlenmişler fakat teknolojik ilerlemeler kadınların mutfak işlerini kolaylaştırmak yerine var olan işlerinin üzerine iş katmıştır. Kadınların mutfak dışında iş arayışlarına girmesi üzerine mutfak, çok işlevli ve estetiksel yönü evin diğer kısımlarıyla eşit önem taşıyan bir alana dönüşmüştür. Günümüzde mutfağı ev sahipleri ve aynı zamanda misafirler için daha çekici bir görünüme sokmak amacıyla hatırı sayılır bir para ve zaman harcanmaktadır. Günümüz mutfağında temizlik ve yemek pişirme için harcanan zamanı azaltma ve işlevselliği artırmayı hedef alan farklı çözümler kullanılmaktadır.

Mutfak endüstrisinin gelişmesiyle, işlevsel küçük bir mutfak tasarımı yaratma becerisi büyük oranda önem kazanmıştır. Yer azlığı ve görsellik ve aynı zamanda dikkatli planlama gereksinimleri olmak üzere ihtiyaçlar teknoloji gibi çözümleri su yüzüne çıkarmıştır.

Tasarım sürecinin özgün yönlerinden biri olan teknoloji sürekli olarak gelişmesinin yanında özellikle küçük mutfaklar ve bileşenleri gibi olmak üzere mutfak tasarımı

üzerinde özel etkisi olan bir alandır. Bu araştırmanın amacı, mutfak tasarımı ve teknoloji arasındaki ilişkiyi, mutfakların etkinliği üzerindeki rolünü ergonomik konfor kavramı yönünden göz önünde bulundurarak değerlendirmektir.

Bu çalışmada, mutfak tasarımında fiziksel konfor ve etkinliğin yanında ergonomik boyutlar incelenip aynı zamanda mutfağın teknolojiyle bağlantılı olan gelişimi de araştırılacaktır. Örnek olay incelemesi kısmında belli sayıda şirket seçilmiş ve teknolojiyi de içeren farklı yönler göz önünde bulundurularak incelenmiştir. Bu araştırmada mutfak tasarımlarındaki teknolojik gelişmelerin yararlarını araştıran nitel ve aynı zamanda nitel araştırmanın bir türü olan yorumsal araştırma yöntemleri kullanılmıştır. Araştırma, teknolojinin uluslararası mutfak markaları üzerindeki rolünü belirlemek amacıyla aynı zamanda nicel, diğer bir tanımla sayısal, araştırma yöntemleri de içermektedir.

Anahtar Kelimeler: Mutfak tasarımı , Teknoloji, Mutfak dolapları, Beyaz eşya, Mutfak aksesuarları, İşlevsellik

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TABLE OF CONTENTS

ABSTRACT	3
ÖZ	5
ACKNOWLEDGMENTS	1
List of Tables	5
List of Charts.....	6
List of Figures	7
1 INTRODUCTION.....	1
1.1 Definition of the problem.....	6
1.2 Aims	7
1.3 Limitation of the study	7
1.4 Method of the study	8
1.5 Outline of the study.....	9
1.6 Key Concepts	10
2 EFFICENCY AND PHYSICAL COMFORT IN KITCHEN DESIGN.....	11
2.1 Kitchen as a workplace	12
2.1.1 Work sequence.....	14
2.1.2 Importance of the Kitchen Triangle	22
2.1.3 Kitchen layouts.....	24
2.2 Ergonomic Dimensions for Kitchen Components	34
2.2.1 Cabinets.....	38
2.2.2 Appliances.....	40
2.2.3 Accessories.....	43

2.3	Chapter Conclusion.....	46
3	TECHNOLOGICAL IMPROVEMENTS IN KITCHENS	47
3.1	Evolution of Kitchen Design.....	47
3.1.1	19 th century and kitchen design.....	47
3.1.2	20 th century and kitchen design.....	52
3.2	Technological improvements in Kitchen Component.....	57
3.2.1	Technological Improvements in Cabinetry	57
3.2.2	Technological Improvements in Appliances.....	63
3.2.3	Technological Improvements in Accessories	69
3.3	Summary of technological developments in kitchen components	73
	ANALYSIS OF WEBSITES OF DIFFERENT KITCHEN COMPANIES IN TERMS OF TECHNOLOGY	76
4.1	Methodology of Analysis.....	76
4.2	Evaluation of selected companies according to keywords.....	79
4.2.1	Evaluation of Selected Cabinetry Companies In Terms of Keywords	82
4.2.2	Evaluation of Selected Home Appliances in Terms of Keywords.....	90
4.2.3	Evaluation of Selected Accessory Companies in Terms of Keywords.....	93
4.3	Discussion of results	97
	CONCLUSION	102
	REFERENCES.....	108
	APPENDICES	120
	Appendix A: Classification of 141 kitchens that attended Milan Fair of 2011	120
	Appendix B: Evaluation of selected companies in terms of keywords.....	95

Appendix C: Cabinetry Company With The Highest Ratio of Occuring Keywords:	
Karftmaid	136
Appendix D: Home Appliance Company With The Highest Ratio of Occuring	
Keywords: Bosh Appliances	104
Appendix E: Accessory Company with The Highest Ratio of Occuring Keywords:	
Alno Ag.....	153

LIST OF TABLES

Table 1: Hardware dimensions (URL 7).....	46
Table 2: Integration of technology in kitchen design.....	74
Table 3: Selected Cabinetry brands from four frequent countries	77
Table 4: Selected Home Appliance brands from four frequent countries.....	78
Table 5: Selected Accessories brands from four frequent countries.....	78
Table 6: classification of keywords in relation to cabinetry	1
Table 7: The most and the least frequently appearing keyword in ascending order.....	90
Table 8: classification of keywords in relation to home appliances	89
Table 9: The most and the least frequently appearing keywords.....	93
Table 13: The most and the least frequently appearing keyword in ascending order.....	96
Table 14: The most and the least frequent group of keywords for Cabinetry.....	97
Table 12: The most and the least frequent group of keywords for Home Appliances.....	99
Table 13: The most and the least frequent group of keywords for accessories	100

LIST OF CHARTS

Chart 1: The frequency of appearing keywords in terms of Cabinetry	89
Chart 2: The frequency of keywords in terms of cabinetry	90
Chart 3: The frequency of appearing keywords in terms of Home Appliances.....	92
Chart 4: The frequency of keywords in terms of home appliances.....	93
Chart 5 : The frequency of appearing keywords in terms of accessory	95
Chart 6: The frequency of keywords in terms of accessories	96

LIST OF FIGURES

Figure 1: Diagram of work sequence in the kitchen	15
Figure 2: Storage options in a small kitchen.....	17
Figure 3: There is not enough space for all items in this fridge	17
Figure 4: Solution for food preparation in a small kitchen.....	18
Figure 5: Mini preparation Area	18
Figure 6: Example for dry preparation area.....	19
Figure 7: Single oven and hob	20
Figure 8: Fold up chairs and table.....	21
Figure 9 : Multifunctional kitchen space	22
Figure 10: Plan demonstrating work sequence and kitchen triangle.....	23
Figure 11: (Linear) In-Line	25
Figure 12: Two Sided or Gallery (Linear Parallel Design).....	25
Figure 13: L-Shaped.....	25
Figure 14: U-Shaped	26
Figure 15: Island	26
Figure 16: The triangle for an ‘In-line (Linear)’ kitchen	27
Figure 17: A linear kitchen design	28
Figure 18 : The plan of the linear kitchen design	28
Figure 19: The triangle for a ‘Gallery-type (Linear Parallel Design)’ kitchen.....	28
Figure 20 : The picture above shows the linear Parallel kitchen design	29

Figure 21 : The plan of the linear parallel kitchen design.....	29
Figure 22: The triangle for an ‘L-type’ kitchen	30
Figure 23 : Picture and the plan of an L- shaped kitchen design	30
Figure 24 : Picture and the plan of an L- shaped kitchen design with a bar installment .	30
Figure 25: The triangle for a ‘U-type’ kitchen	31
Figure 26 : Picture and the plan of a U- shaped kitchen design.....	31
Figure 27 : Picture and the plan of a U- shaped kitchen design as a form of U-Shaped Kitchen	32
Figure 28 : Picture and the plan of a Circular Shaped kitchen design	32
Figure 29: Picture and the plan a linear with U-shaped kitchen design.....	32
Figure 30 : Picture and the plan of the linear design with a Z-shaped Island kitchen	33
Figure 31 : Plan of the linear design with Z-shaped Island kitchen.....	33
Figure 32 : Picture and the plan of the linear design with an I-shaped Island kitchen	34
Figure 33: Small kitchen plan, internal room dimensions: 1.9m wide and 4.4 m long ...	35
Figure 34: Small kitchen design.....	36
Figure 35 : Key dimensions on plan in a kitchen design	37
Figure 36: Ergonomic counter heights	39
Figure 37: Recommended Worktop Height for Individuals	40
Figure 38: Various location of oven.....	41
Figure 39: Ideal oven placement	41
Figure 40 : Dishwasher Height	42
Figure 41: Worktop heights	44
Figure 42 : Positioning of the cooker or hob.....	45
Figure 43: Cooking Stoves.....	49

Figure 44: The late 19 th century pantry	51
Figure 45: Frankfurt kitchen	53
Figure 46: On of the firs refrigerators	53
Figure 47: Built-in kitchen cabinets	59
Figure 48: Cabinetry design ranges	59
Figure 49: Powder coating in cabinetry	60
Figure 50: Cabinetry prefacing	61
Figure 51: Example of the Basic Structure of a Framed Cabinet	62
Figure 52: Example of Frameless Cabinet Construction	63
Figure 53: Kitchen with appliances.....	65
Figure 54: Appliances for Home Interior Design and Creating Future Kitchen Trends	66
Figure 55: Future kitchen appliances concept.....	67
Figure 56: Multifunctional kitchen appliances	68
Figure 57: kitchen worktop made of Corian	70
Figure 58: Different types of sinks	70
Figure 59: Kitchen shelves.....	71
Figure 60: Pull out tray shelves.....	72
Figure 61: Examples of company kitchens in Cabinetry retrieved from selected Company websites	98
Figure 62: Example of Home appliances retrieved from selected Company websites ...	99
Figure 63: Examples of Accessories retrieved from selected Company websites.....	100

Chapter 1

INTRODUCTION

In today's world, the kitchen is accepted as an essential part of family gatherings as well as an important space for cooking and eating. Many kitchens are still being developed without taking into consideration the different characteristics of a variety of users including elderly, disabled, and children. When these characteristics were considered and kitchens were designed and developed accordingly, some of them presented real problems with being commercialized since their aspect is not applied to others (Young Jun Ko, 2007). Kitchen designs were also revamped focusing solely on the physical aspects such as the adjustment of the counter top, but neglected the fact such as using technological advancements to increase the accessibility of the kitchen. (Young Jun Ko, 2007).

In most cultures, the kitchen is the most centered room in the house. Kitchen is a place where adults gather and children naturally move. The kitchen's sole purpose is no longer just for dining. Designing a kitchen is usually the largest financial investment after purchasing a house or a flat and it is all too easy to purchase appliances, cabinets, and various other accessories that look attractive in catalogues or showrooms but do not meet the requirements of your daily life and cooking habits (Grey, 1998).

A good kitchen design is essential in order to integrate functional requirements together with spaces which are pleasant to work in. Before analyzing these necessities, it is essential to travel back in time to observe the evolution of contemporary kitchens. This will help demonstrate different activities and necessities so as to realize how basic modern technology has condensed both the space and the needs of human beings (Baden-Powell, 2005).

The importance of kitchens became more apparent since 1970's. In Europe, it became the most important part of the house as Feyerabend defines (1979) it as "something between a temple and a museum". Fredrick Taylor's book entitled 'principles of scientific Management' created an enormous impact on the daily operations of offices and factories. 'The twelve principles of Efficiency' was published by Harrington Emerson in 1912. Through 1913 and onwards, Christine Frederick published various articles entitled "New Household Management" based on kitchen efficiency and at a later date, she decided to adopt the name to be the title of her book that was published in 1919. The book provided various step-saving plans which solved the traditional problems associated with too many steps around the kitchen that had to be taken in order to accomplish certain tasks. Christine Frederick was one of Gilbert's close colleagues and a personal friend. Frank Bunker Gilbert was studying Motion Study for scientific management. Frederick and Gilbert worked on several projects together. Christine Frederick wanted to benefit from Taylors expanding influence, thus expressing the need to transform houses into a sort of production line that is clean, hygienic and above all, efficient. Frederick Winslow Taylor was a mechanical engineer that pushed to achieve a higher standard of industrial efficiency. Taylor was focused on reducing the process

times whereas Gilbert sought to reduce the number of motions that a user must follow in order to achieve an end result (Cieraad, 2002).

About the kitchen in particular, Frederick once wrote, “It is the wrong idea that many women have of making their kitchens look like other rooms, with instruments tucked out of sight. A kitchen is a workshop where efficiency should rule over mere looks.” (Frederick, 1912). However today, with the effect of minimalism, the workshop is hidden behind minimalist surfaces. The key to understand the domestic sphere was considered is within the rubric of industrialization. What happened was that this brought the kitchen into public view and into the realm of technology intervention.

According to the Merriam Webster Dictionary (2011), technology is the first use of science in solving problems and then a technical method of doing something (Webster). Technology is important in many scientific fields including: communication, energy, food production, medical, military, and transportation. The impact of technology on our daily life can be describes as: Technology is important in everyday life because it makes everyday tasks much more efficient. How does technology make your life easier each day? There are many technological advances that modern people take for granted every day in the western world (Kubesh, 2009).

Technology is not just a collection of technological productions, but it is also about how people use them to meet their specific needs and about how this all impacts the world as we know it. Ultimately, technology is an expression of our endeavors to adapt to the world where we live, in order to meet our needs and desires. Technological actions may

therefore be termed as a form of goal-oriented human behaviors aimed at primarily resolving practical problems. The philosophy of technology touches on a wide range of issues, but there are also limits that are not all purposeful. Human action falls under the heading of technology (Vermass, 2011).

Introducing the kitchen into a technological environment with an emphasis on the implementation and the use of technology in the future, kitchens became one of the key points of innovation and development.

According to Doolittle (2000), “the ‘house of tomorrow’ is a vision perpetually deferred and one that tells us more about the preoccupations of the time than it does about the designs of the future”. The author continues as:

“The semantic shift that seems to have occurred within the last ten years: The language of the houses of tomorrow will be replaced with digital smart houses. Articles on smart homes refer to home automation, energy savings, interactive appliances, remote controlling, home networking, wireless devices, entertainment centers, and security systems. As one critic refereed to it, the smart house is a “fully computerized technology, eats nothing but instant noodles, and cannot cook”. This is a matter of some distress for him. A household needs to serve and even anticipate your daily needs” (Doolittle, 2000, p. 10).

Taking a slightly different track, the director of the Smart Homes Foundation in Netherlands stated that smart home technology is the integration of technologies and

services applied to homes, flats, apartments and houses and small buildings with the purpose of automating them and obtaining an increased safety, security, comfort, communication and technical management (Berlo, 2000).

The process of kitchen work and the activities contained within the kitchen, reflect the requirements that need to be considered in order to design smart kitchens with components suitable for that particular house such as storage, preparation/cooking, dining and accessibility of the cabinets being the most important requirements. Storage compartments such as upper and lower cabinets and their design efficiencies in the kitchen is usually the most important requirements (Young Jun Ko, 2007).

Technology began in ancient times but it was not until the industrial revolution in the 18th century that the world began seeing how technology could dramatically change everyone's lives and everyday tasks. Today, we have very sophisticated technologies that helped make modern society the way it is today (Kubesh, 2009).

Technology will be roughly divided into "pre modern" (traditional) and "modern" types, with modern technology being based on systematically organized innovations, whereas the former emerging from mere coincidences (Richter, 1982).

When creating technology for home use, particularly for the kitchen, the fact that these domestic spaces are inhabited and used by individuals is disregarded. Therefore technology same as any other advanced element being introduced to architecture and human life, is required to be controlled and utilized in the most efficient way,

concerning both user and kitchen market benefits. These spaces function not as locations for technology, but as a location where meaning is produced, meals are served and where these spaces are the locations where we dwell (Bell, G & Kaye, J, 2002).

It is important to note that the kitchen has evolved at the same pace as fire enclosures have evolved. Humans shaped the kitchen space accordingly with clever engineering techniques as they mastered the art of containing fire in a more efficient manner. Human beings shaped the kitchen accordingly to match engineering advancements to include fire more effectively and efficiently. Evolution of the kitchen is therefore dependent upon the history of cooking and as Atalay & Hastrof mention, (2006), microwave ovens after stoves affected the physical evolution of the kitchen. (Atalay & Hastrof, 2006).

Kitchen components are required to be functionally oriented in order to provide accessibility, efficient usage of storage space, and in better word, creating ergonomic comfort into the kitchen space. This would enhance great saving on time and effort during any activity occurring in kitchen and avoids any unnecessary movement during the usage (URL 1).

1.1 Definition of the problem

Technology has been developing so rapidly, that the numbers of new inventions become limitless. Kitchen like any other space of home has been either directly or indirectly influenced by the development of technology. Invention of new materials, appliances, hardware's and new gadgets did not just affect the kitchen components such as cabinetry, home appliance and accessory, it also has created the chance of providing efficiency and comfort by help of ergonomic science in improvement of kitchen layout

as one of the greatest influences of development of technology. With the invention and the integration of technology into a kitchen design, there are limitless types of efficiencies that it creates, there are also drawbacks and problems that arise during the process which needs to be discovered and solved appropriately in order to minimize workflow disruptions. Visual quality, space quality, environmental quality, psychological comfort, careful planning etc. must be studied.

In order to investigate such influences, it is required to investigate the history and background of technology in kitchen industry and kitchen space evolution. Afterwards what issues has been introduced to the kitchen industry, which could assist the designer to consider the issues which haven't been concentrated on, in order to develop the later inventions in relation to kitchen and kitchen component.

This study will focus on the role of technology in response to the above cited problems on kitchen designs in order to satisfy the following question:

“What is the role of the technology in providing the efficiency of kitchen design?”

1.2 Aims

The aim of this study is to demonstrate the relationship between kitchen design and technology by questioning the role of technology in the efficiency of kitchens through ergonomic comfort.

1.3 Limitation of the study

This research focuses on the technological aspects of kitchens which are related to efficiency of kitchens in relation to human comfort. The technologies that are directly

related to industrial engineering or mechanical engineering are beyond the scope of this study. Technology is limited with the components which are used in the design of kitchens in terms of cabinets, appliances and accessories in ‘usage stages’ but not the ‘production stages’.

It is believed that technology and its improvement plays an important role in kitchen designs. This study is concentrated on technology, efficiency and comfort in kitchen design. The case-studies will be selected from international kitchen brands which have appeared in the Milan Fair Kitchen section in 2011. The reason for this is that these brands belong to large groups of companies who invest in the research of kitchen designs. In the research sections of these brands, they generally work towards introducing futuristic technologies into our daily lives. Evolution of kitchen is also limited in relation to the technology. After wards these studies are limited to the influence of technology on development of cabinetry, home appliance and accessories as kitchen components. The case-study analysis is limited to 12 companies for each type of component, randomly selected from the most frequently appearing 4 countries out of 141 international kitchen companies.

1.4 Method of the study

This research is based on the qualitative methods that explore the benefits of technological improvements in small kitchen designs and the interpretative research methods which is a type of qualitative research. It also includes quantitative research methods for determining the role of technology in international kitchen brands. Literature reviews which would support the theoretical framework is gathered from books, articles, papers and web sources.

For the case-study analysis, 141 kitchen related companies including cabinetry, appliances and accessories manufacturers, which participated in the cucina section which is kitchen section of Milan Fair 2011, are scanned through the keywords which were retrieved through the investigation and literature review.

Therefore each company's website has been investigated individually and accordingly to find out their production categories. After the analysis, 3 companies are randomly selected from four of the most frequently appearing 4 countries. These 36 companies (12 companies for cabinetry, 12 for home appliances and 12 for accessories) are examined to find out their priorities by scanning through their promotion web-sites according to a checklist of derived keywords.

Furthermore three matrices are formed in order to analyze the determined keywords for randomly selected kitchen companies. These matrixes are separately analyzing the keywords for each category: cabinetry, home appliances and accessories, visualizing the frequency of appearing keywords and amount of concentration of each selected company on any particular keyword.

1.5 Outline of the study

The thesis consists of five chapters. The first chapter introduces the problem and sets out the goals and objectives. Furthermore, scope and limitation of the study will be defined within the frame of certain key features, which form the overall structure of the thesis.

The second chapter conveys efficiency and physical human comfort in kitchen design where key concepts are referred to throughout the study in order to provide a common understanding within other chapters.

Furthermore, the third chapter investigates the technological improvements in kitchen design, especially focusing on the kitchen components as ‘cabinets’, ‘home appliances’, and ‘accessories’.

The fourth chapter deals with the analysis of the promoting websites of various International Kitchen Brands in relation to the technological improvements of kitchens to clarify their priorities in their discourses.

The fifth chapter consists of some recommendations and the conclusion of the study.

1.6 Key Concepts

The main keywords that are directly related to the study which will be extensively used in this study are: “technological improvements”, “kitchen design” and “Efficiency”. And with the analysis of International Kitchen Brands in regards to the technological improvements in small kitchens, the research will investigate the technological improvements of today’s kitchen design.

Chapter 2

EFFICENCY AND PHYSICAL COMFORT IN KITCHEN DESIGN

Kitchens are further than just a space being utilized to prepare food. Today kitchen does not only act just as a workplace. The texture, surfaces, furniture, cabinets, appliances and accessories can state different roles of kitchen. “Modern kitchens have their own distinctive visual aesthetics. It is also an aesthetic deeply rooted in non-aesthetic judgments about how kitchen work is best done, one frequently heavy with moral overtones. The intermeshing within kitchen design today of aesthetic values with moral and social values was steadily consolidated as the century progressed and is distinctively twentieth century, though now carried on into the twenty first century. And though of recent origin, this socio moral aesthetic is now so pervasive that purchasers of new kitchens often take it for granted” (Freeman, 2004, p. 77). However, apart from the aesthetical point of view, there are other issues which must be considered in kitchen design.

Kitchen is one of the most important spaces in the house. Whoever spends time in the kitchen knows that it is an important area of the house. Unless the kitchen is comfortable, the user will not be satisfied within the space.

According to the considerations of ergonomic design, the size of the kitchen is a very important factor to a user and it should be integrated into the planning of a kitchen which should include the shape, size, and the space that is calculated (Fraser, 1972).

The kitchen is the most specialized space within a house. It has become a working area that defines the heart of the house. It has been discussed extensively throughout ergonomics literature, perhaps due to its label as loosely considered “work” (Pheasant, 2005).

2.1 Kitchen as a workplace

“A good ergonomics kitchen design must put physical, cognitive and organizational ergonomics into consideration. It is defined by the 'kitchen work triangle' and must also remember the ergonomics of good lighting” (Colin, 2011).

Physical Ergonomics is required to be considered in kitchen design, since it revolves around human and body interaction with kitchen components such as cabinets, appliances and accessories. Eg: sink, stove, oven, etc.

Cognitive ergonomics is required to be considered in kitchen design; since it concentrates on organization of work sequence and how mind acts in the space of kitchen. Therefore layout of kitchen can influence cooking, washing and any other functions happening in kitchen.

Organizational Ergonomics is applied whenever kitchen design is concentrating on optimizing the kitchen workplace. “There is no doubt that the kitchen is certainly one

place that requires cleaning often. This is due to the fact that the tasks performed in the kitchen area create mess easily and more frequently than most other rooms in the house, it's, after all, the sole place in the house which is meant for work, one where food for the entire day is being cooked and prepared. But because it is where meals are prepared, it ought to always be clean," (URL 6).

Therefore, the kitchen is a production area and great care should be taken to abide by specific rules in the kitchen space.

The human body is the constant in the equation of movement abilities. It is important to understand that the design of the kitchen must not be modified to fit the environment, but in fact, the environment of the kitchen design must be modified in order to fit the needs of the user's movement abilities. It is imperative to decrease movement by terminating unnecessary steps and make the kitchen applicable to all users in a household (Strangeland, 2011).

An accessible kitchen design is based equally on the functions required in the space and the capabilities of the user. These elements must work in harmony to provide a practical kitchen in which disabled persons will feel comfortable and self-sufficient. Kitchens require extensive design considerations as they involve plumbing, appliances, implements, countertops and, of course, food. A barrier-free kitchen should address these factors effectively for a space that not only eases food preparation tasks, but also gives the user the ability to gather with their family in the space, entertain and move around without difficulty (Serra, 2011).

2.1.1 Work sequence

Work sequence is defined as: Arrangement of activities that vary between food storage, preparation and washing, cooking, serving and eating. Some cross-circulation is guaranteed, sink is needed for both preparation and washing-up, storage of food is existent both in a refrigerator and in the cabinets.

“The best way to start planning a kitchen design is to consider the position of the basic elements; the cooking equipment, the sink and the refrigerator. The formula for a convenient and safe working space between these items can take the form of one unbroken line or a closely related ‘working triangle’ (Smith, 2011, p. 43).

In Figure 1, the thicker arrows point out the major flow of activity. Quite a lot of cross-circulation is apparent and this is not unusual – cross-circulation is especially apparent when storing goods in a refrigerator or in the dry store. The Wet Zone and the Dry Preparation area are the same mainly as the worktop between the wet zone and cooking should be unbroken for ease of transferring heavy pans from sink to hob.

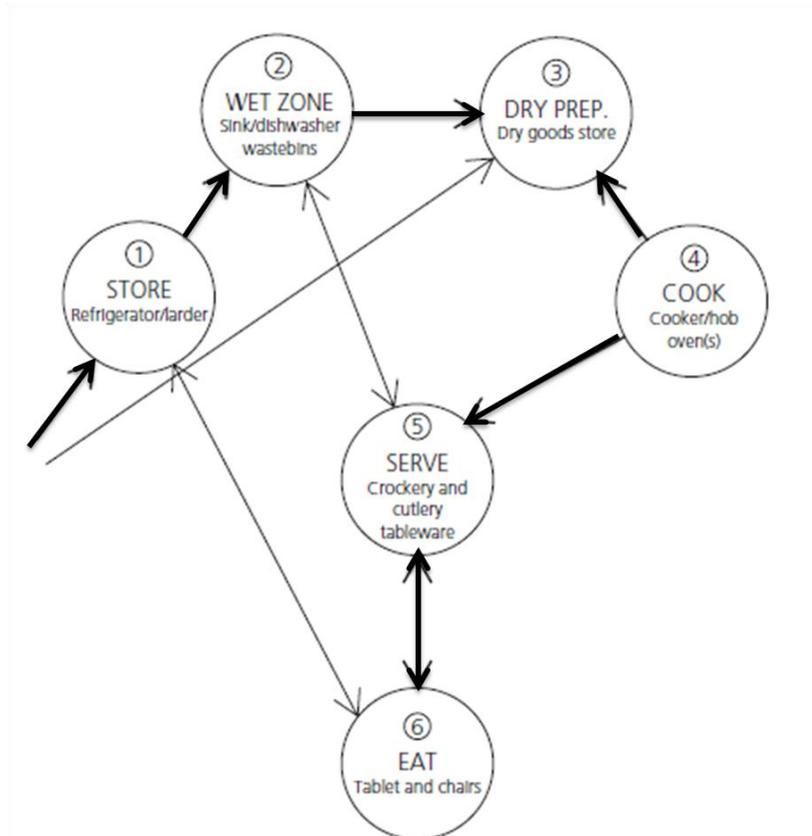


Figure 1: Diagram of work sequence in the kitchen Source: (Baden-Powell, 2005)

The progression of order is normally to plan in a clockwise direction from left to right but this is not always true as people who are left-handed prefer an anti-clockwise approach. According to the explanation of the work sequence above, there are three activities which describe three significant components which are the refrigerator, the cooker and the sink. These elements are connected through the work triangle (Baden-Powell, 2005).

Small storage may discourage a user from storing food in the freezer due to the lack of space, so if there isn't enough space for proper storage, certain fresh foods and baked

foods will be spoilt. In order to eliminate such dilemmas, a proper solution must be implemented to make the most of a user's storage (Grey, 1998).

2.1.1.1 Storage Areas

Combining the living room space with a kitchen has become the main issue over the past few years due to the rising importance of kitchens, cooking and lifestyle changes. For many years, furniture was stacked to the ceiling to maximize storage space within the kitchen. As the priority of lifestyles shift, more questions arise about the volume of cabinetry. Questions such as the placements of pots, pans, dishes, cutlery, tools, small appliances and other various goods arise. Consequently Storage is an area in the kitchen which needs a clever arrangement solution (Spechtenhauser, 2006).

Storage can be classified as cabinet storage, larder storage and cold storage (Fridge-Freezer). Therefore there are different solutions for issues related to each individual classification.

For instance before considering which fridge or freezer satisfies a user's requirements, one must visualize the space available, the number of members in a household and where the appliances will be placed in the kitchen. It should be mentioned that the fridge is one of the main appliances in the kitchen and if a user must burden them in order to access the fridge-freezer, it becomes very time consuming and irritating (Grey, 1998).

Also as shown in the figure 2, in relation to storage, glass shelves as an option could provide storage solutions without taking up the workbench or cupboards. It is imperative that glass shelving's be made of strong material such as reinforced glass. In order to gain

space in a kitchen, ceilings can be raised and lighting or sky lighting can be installed in order to eliminate the need for windows (Lee, 1998).



Figure 2: Storage options in a small kitchen Source: (Lee, 1998)



Figure 3: There is not enough space for all items in this fridge (Grey, 1998)

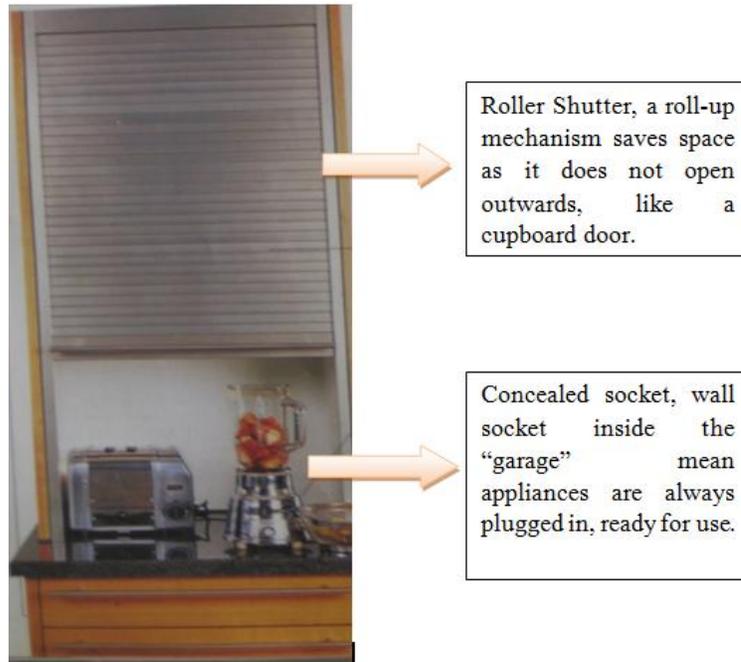


Figure 4: Solution for food preparation in a small kitchen (Grey, 1998)

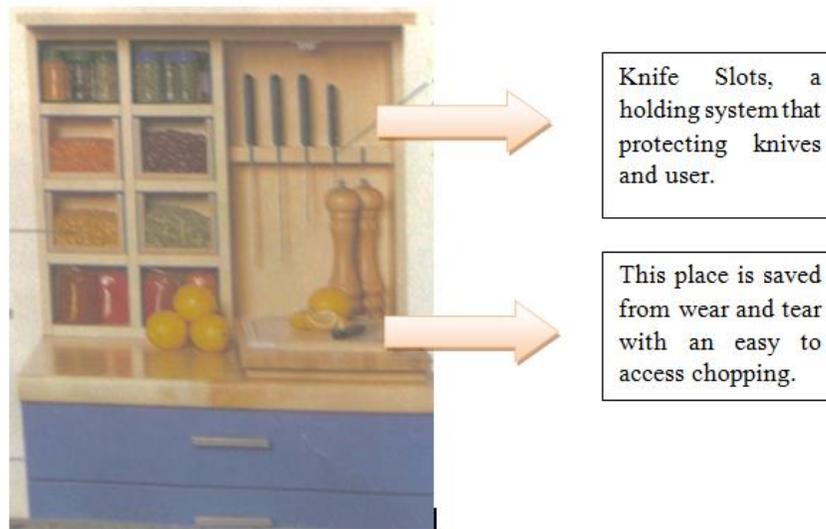


Figure 5: Mini preparation Area: (Grey, 1998)

2.1.1.2 Wet Zones

One of the areas which are used more extensively than other areas in the kitchen is the wash up area. There are several ergonomic aspects which are related to washing up that the designers are expected to solve, which is the height of the sink and the depth of the

sink tub...etc. and have been explained in section 2.2.1 more in details. There are also a variety of sink types such as single or double one with different materials or faucet types and many other pieces which differ according to the user.

2.1.1.3 Dry Preparation Areas (Worktop + Island)

“The dry preparation area of the kitchen is where foods are processed, mixed, combined, held, and etc. Work surfaces and all the other equipment necessary to accomplish the food preparation task are a part of this area of the kitchen” (Birchfield, 2007). Food preparation area needs ample space due to the fact that there is so much traffic in that area. The preparation area is used for pretty much everything. A robust worktop must be present, best location in the room must be reserved for the preparation area, everything must be in a reaching distance and the user must be able to navigate easily between the sink area and the cooking zone.



Figure 6: Example for dry preparation area (Arclinea, 2012)

2.1.1.4 Cooking Areas

“The height of the kitchen work counter, the proper clearance between cabinets or appliances for circulation, the accessibility to overhead or under counter storage, and proper visibility, are among the primary consideration in the design of cooking spaces.

All must be responsive to human dimensions and body size, for the quality of interface between the user and the components of the interior spaces to be adequate. In establishing clearance between counters, the maximum body width and depth of a user of a larger body size must be taken into account as well as the projections of the appliances. Refrigerator doors and cabinet doors of project to some degree in their open position into the space within which the user must circulate and must be accommodated” (Panero & Zelnik, 1979, p. 139).

Hob and extractors on the other hand are also necessary to maintain the efficiency of a kitchen to prevent cooking odors and steam. Therefore Ventilation is a vital factor in a kitchen design and for that reason; space limitation could affect the quality of ventilation (Grey, 1998).

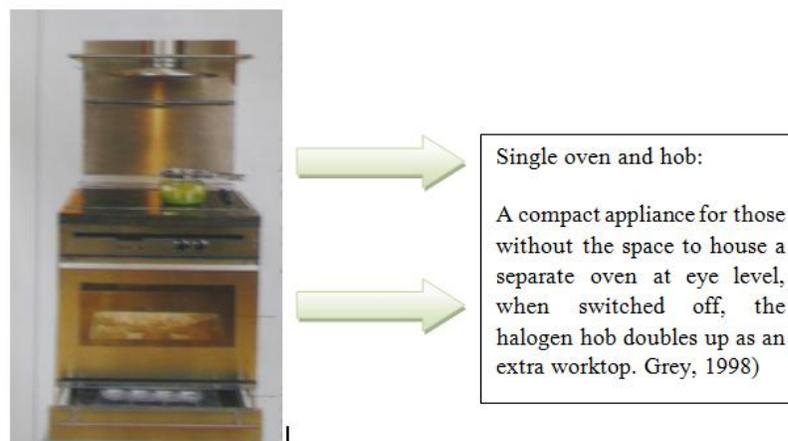


Figure 7: Single oven and hob Source: (Colin, 2011)

2.1.1.5 Serving Area

Service area connects food preparation area to dining area. The connection of the hot food and cold food preparation areas are also very important. (A small difference between these two functional areas will provide a reduced labor cost and a higher quality food product. Conversely, a long distance between these areas will increase the cost of labor and equipment significantly and make it much more difficult to keep foods at proper serving temperature (Birchfield, 2007).)

2.1.1.6 Eating Areas

Eating area is the gathering place where members of the family converse and spend quality time. For this reason, the table should be placed at the most comfortable space in the room, and it is preferred to be exposed to natural light near a window (Grey, 1998).

If the kitchen is carefully planned, a small built-in table can be integrated which is enjoyable for dining on and will enrich the kitchen experience. Fold-up table and chairs are good solutions for those who desire to eat in the kitchen but do not have enough space; on the other hand, some tables can be uninged to save more space around the kitchen.

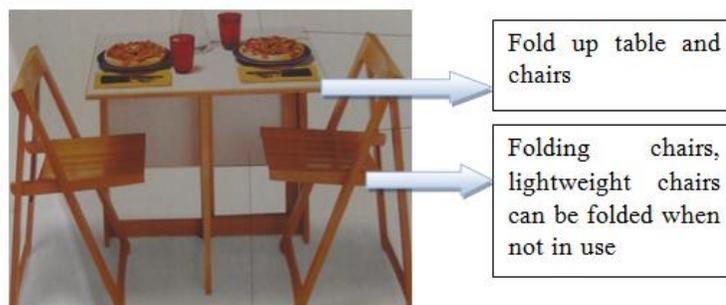


Figure 8: Fold up chairs and table: (Colin, 2011)

Using the eating area for eating at dinner time and turning it into something more useful at other times saves not only a small amount of space but a whole roomful of space.

In addition, the people sitting at table may end the dinner by an informal conversation which may cause a change in the posture of the person and the place of the chairs, even further. Assuming any possible distance of the eating area settlement, brings up the fact that comfortable clearance is required to be considered beforehand (Panero & Zelnik, 1979).



Figure 9 : Multifunctional kitchen space: (Ward, 2011)

2.1.2 Importance of the Kitchen Triangle

Estimating the kitchen's traffic flow is considered one of the most important issues related to design or organization of the kitchen, which establishes the necessity of the 'kitchen triangle' in providing the efficiency of the kitchen space (McLellan, 2003). As

Coran (2002) states the main essential and significant rule in a kitchen is the work triangle or kitchen triangle. The ergonomic studies concentrate on the particular connection between the sink, the cooker and the refrigerator which are all a part of the work areas of the kitchen (Esson, 2010). The main criterion in designing a kitchen space is the size of the kitchen and the kitchen triangle. These particular things have an enduring impact, especially in task performance and in daily meal preparation (Taha & Sulaiman, 2010).

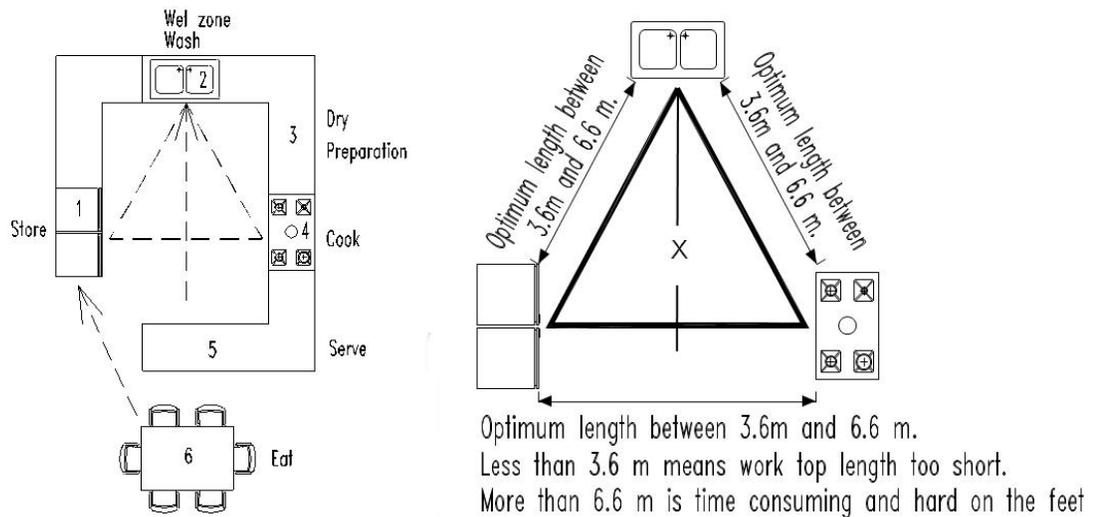


Figure 10: Plan demonstrating work sequence and kitchen triangle
Source: (Baden-Powell, 2005)

Therefore if the area of triangle is more than 18.84m², it could not be comfortable.

The entire length of three sides of this triangle, calculated from the center front of each appliance, should not be less than 3.6 m or more than 6.6 m long. If the distance is shorter, the work surface will be inadequate. If the distance is longer, then too much

walking will be involved, making the whole procedure slow and very tiring (Baden-Powell, 2005).

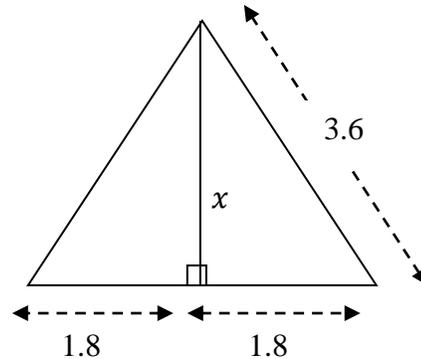
$$(1.8)^2 + (x)^2 = (3.6)^2$$

$$(x)^2 = 12.96 - 3.24 x$$

$$(x)^2 = 9.72m^2$$

$$x = 3.1$$

$$\text{Area of Triangle (Minimum)} = \frac{3.6 \times 3.1}{2} = 5.6m^2$$



Therefore if the area of triangle is less than $5.6m^2$, it could not be comfortable.

And:

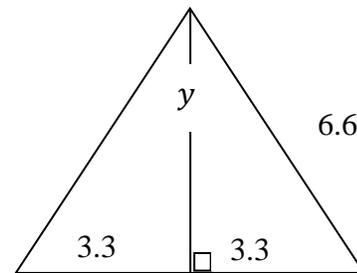
$$(3.3)^2 + (y)^2 = (6.6)^2$$

$$(y)^2 = 43.56 - 10.9$$

$$(y)^2 = 32.67m^2$$

$$y = 5.71$$

$$\text{Area of Triangle (Maximum)} = \frac{6.6 \times 5.71}{2} = 18.843m^2$$



2.1.3 Kitchen layouts

Most people will agree that the kitchen is one of the most important areas in the house. Designing it well will ensure that it combines functionality with an overall pleasing look (Nakhoda, 2011). The kitchen is typically the most used room in any house and an efficient kitchen is typically a key point in having a happy life (Adams, 2011). Understanding the basic principles of a kitchen layout will help take much of the mystery out of the design process (Wallender, 2010).

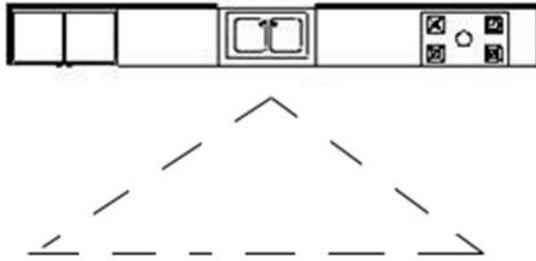


Figure 11: (Linear) In-Line (Baden-Powell, 2005)

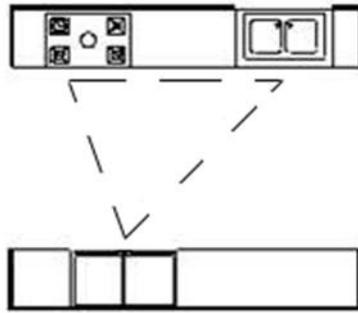


Figure 12: Two Sided or Gallery (Linear Parallel Design) (Baden-Powell, 2005)

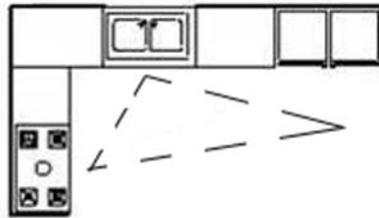


Figure 13: L-Shaped (Baden-Powell, 2005)

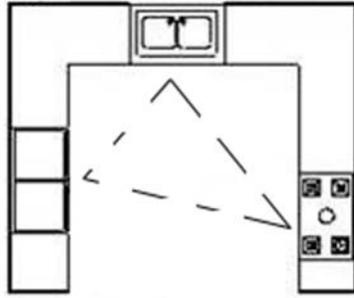


Figure 14: U-Shaped (Baden-Powell, 2005)

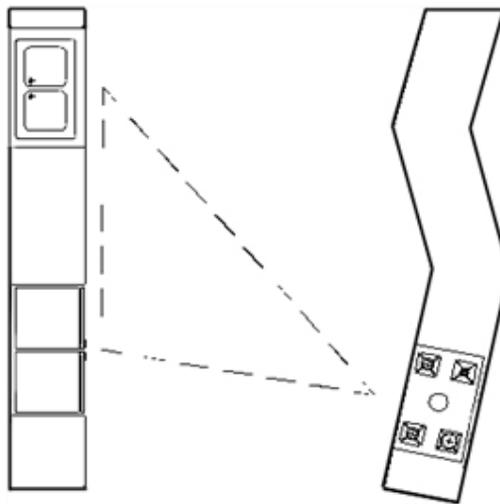


Figure 15: Island (Baden-Powell, 2005)

Figure 11, 12, 13, 14 and 15: shows different types of kitchen layouts with triangle configurations. The figures show different types of triangles that are invisibly created by the kitchen layout. Whatever your kitchen layout looks like, the work triangle will always exist as the appliances and the sink are interconnected. It depends on the user to make it user friendly as well as consider the usefulness of its features in the future (Taha & Sulaiman, 2010).

In Figure 15, it is obvious that the U-shaped plan is the most efficient as it meets all the necessities of a perfect kitchen triangle. It is centrally placed, can rotate round with very little movement among the three appliances and is surrounded with worktops continued by tall cupboards (Baden-Powell, 2005)

2.1.3.1 Linear design (In-Line)



Figure 16: The triangle for an 'In-line (Linear)' kitchen (Adams, 2011)

Linear Designed kitchen is a single walled kitchen which offers a very open and an airy feeling, this design:

- Is ideal for apartments and smaller homes
- Works well with the open designs found in many contemporary homes
- Can Include a small moveable table to provide an eating space
- Can be enhanced with the addition of an island (Wallender, 2010).



Figure 17: A linear kitchen design: (Asensio, 2006)

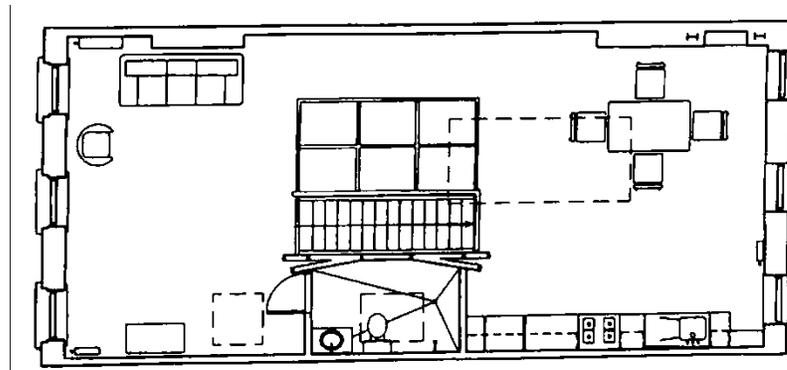


Figure 18 : The plan of the linear kitchen design (Asensio, 2006)

2.1.3.2 Linear Parallel design (Two sided or Gallery Type)

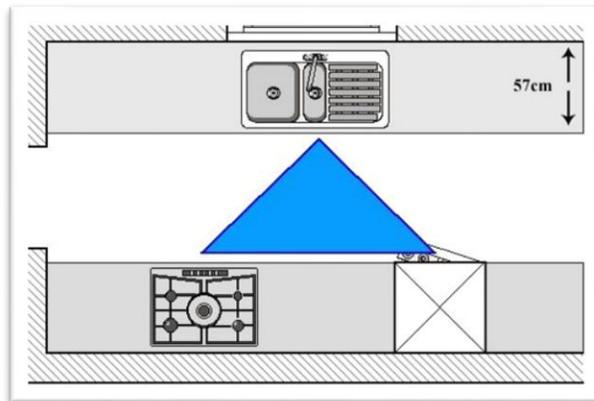


Figure 19: The triangle for a 'Gallery-type (Linear Parallel Design)' kitchen (Adams, 2011)

This style of kitchen makes the most out of a smaller space.

- Great for smaller kitchens
- Appliances are close to one another
- Easy for one cook to maneuver
- Can easily convert to a U-Shape by closing off one end (Wallender, 2010).



Figure 20 : The picture above shows the linear Parallel kitchen design (Asensio, 2006)

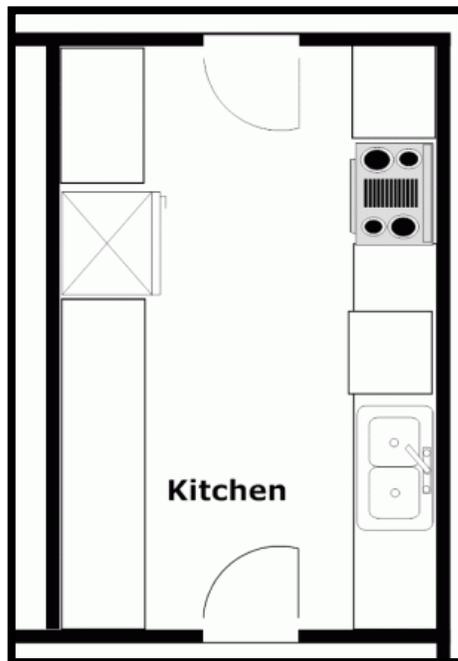


Figure 21 : The plan of the linear parallel kitchen design (URL 2)

2.1.3.3 L-Shaped Kitchen

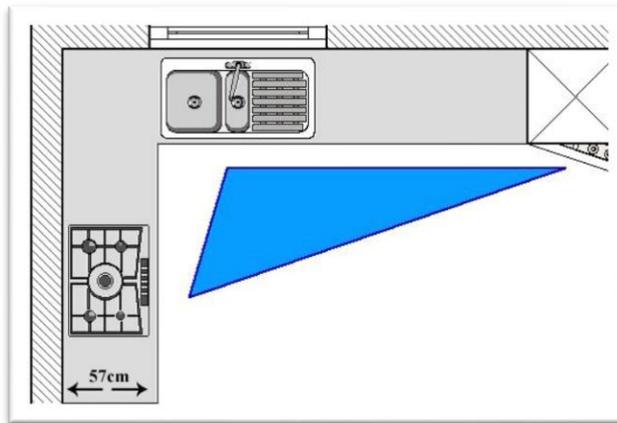


Figure 22: The triangle for an 'L-type' kitchen (Adams, 2011)



Figure 23 : Picture and the plan of an L- shaped kitchen design. (Asensio, 2006)

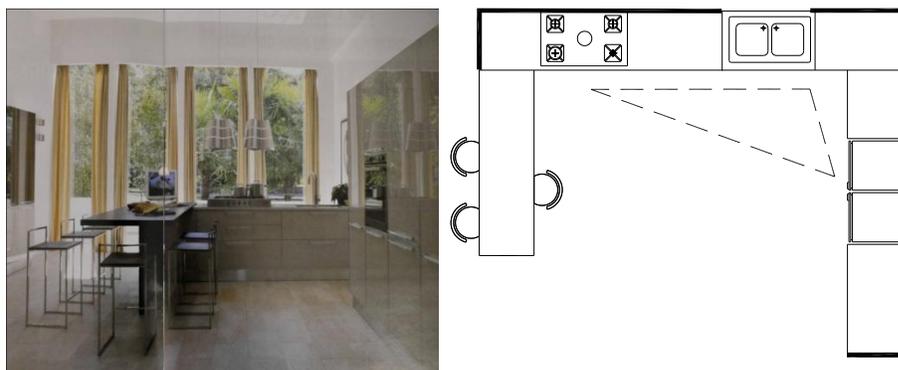


Figure 24 : Picture and the plan of an L- shaped kitchen design with a bar installment:
(Asensio, 2006)

2.1.3.4 U-Shaped Kitchen

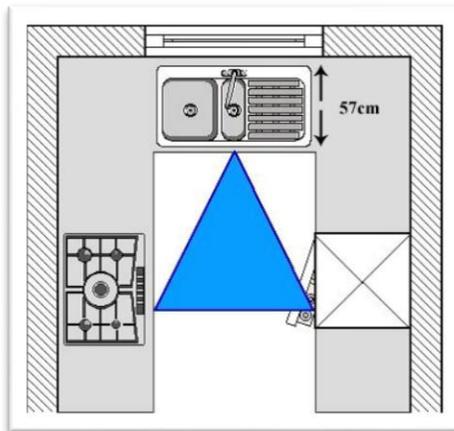


Figure 25: The triangle for a 'U-type' kitchen (Adams, 2011)

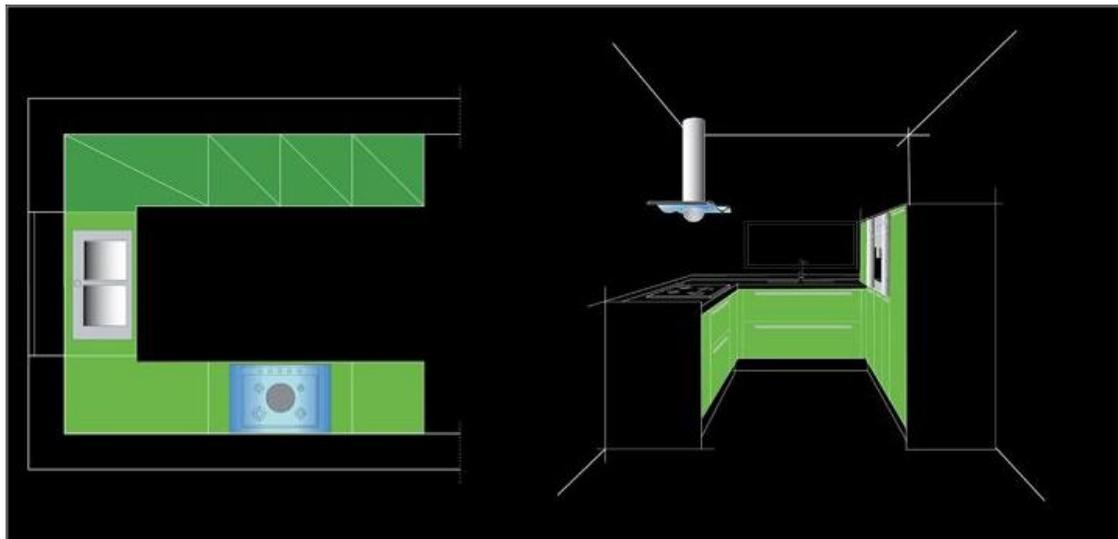


Figure 26 : Picture and the plan of a U- shaped kitchen design (Asensio, 2006)

This kitchen which is named for the "U" shape it resembles is popular in large and small homes alike.

- Perfect for families who use their kitchens a great deal
- Provides plenty of counter space
- Efficient work triangle
- “Can convert one cabinet leg into a breakfast bar” (Adams, 2011).

Also the "U" shape design having the optimum use of available space allows the three chief activities to be clearly differentiated: Food preparation, cooking and Washing up.



Figure 27 : Picture and the plan of a U- shaped kitchen design as a form of U-Shaped Kitchen (Asensio, 2006)

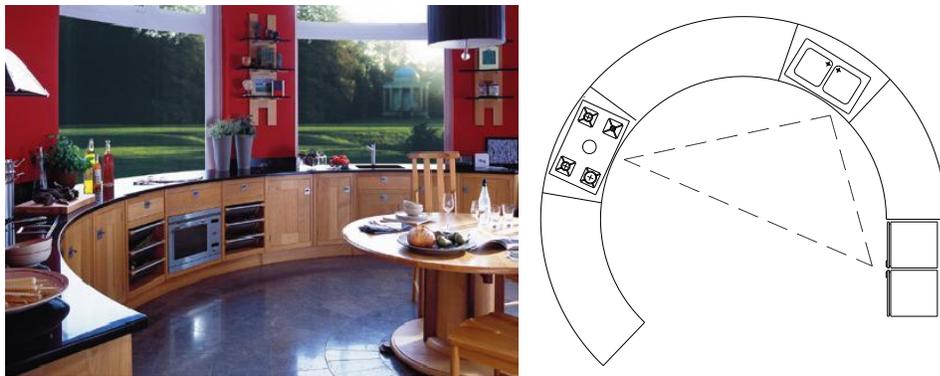


Figure 28 : Picture and the plan of a Circular Shaped kitchen design (Asensio, 2006)

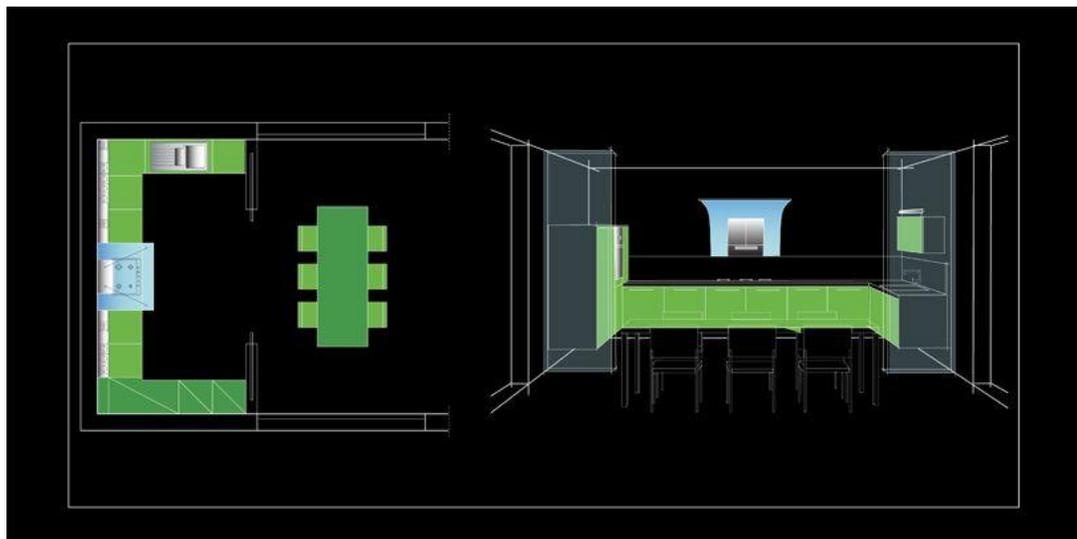


Figure 29: Picture and the plan a linear with U-shaped kitchen design (Studiolabo, 2011)

A good examination for checking the efficiency of a kitchen is to check the steps needed to make pot of tea. This apparently simple job is in fact a composite plan which involves most parts of the kitchen (Baden-Powell, 2005)

2.1.3.5 Kitchen Island

A very popular method of improving the design of a current kitchen is the addition of a kitchen island. A kitchen island adds a lot of functionality to an already existing kitchen, most importantly, more counters space and more cabinets. The type of Kitchen Island chosen depends on the amount of space in the kitchen. There must be enough room to move around freely without obstructing any of the cabinets and appliances.

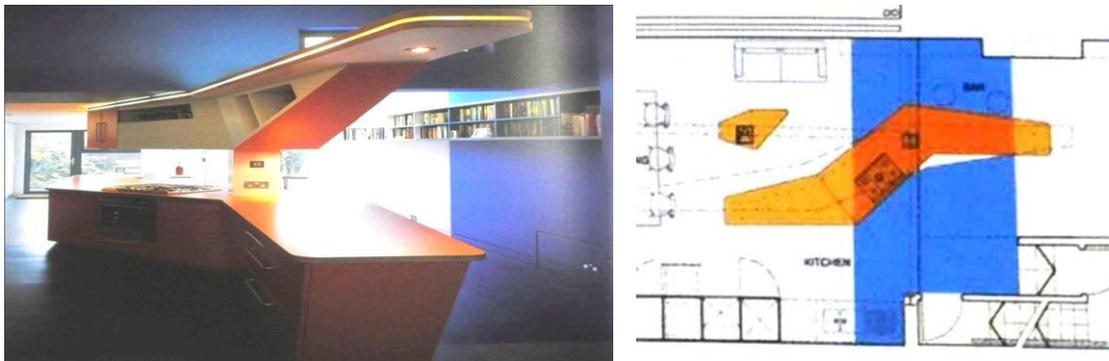


Figure 30 : Picture and the plan of the linear design with a Z-shaped Island kitchen:
(Asensio, 2006)

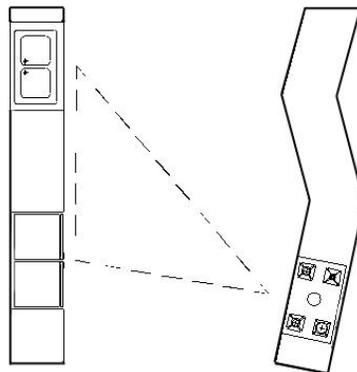


Figure 31 : Plan of the linear design with Z-shaped Island kitchen

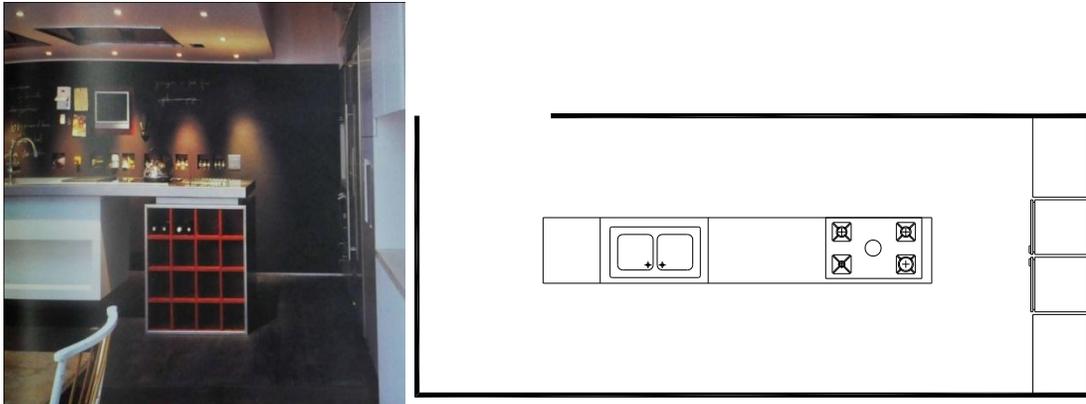


Figure 32 : Picture and the plan of the linear design with an I-shaped Island kitchen (Asensio, 2006)

2.2 Ergonomic Dimensions for Kitchen Components

“Ergonomics is the science of work: of the people who do it and the ways it is done; the tools and equipment they use, the places they work in, and the psychosocial aspects of the working situation” (Pheasant, 2005). In fact, ergonomics is the most relevant factor in kitchen design (Baden-Powell, 2005).

According to Strangeland (2011): “The word “Ergonomic” comes from two Greek words “Ergon”, meaning work, and “Nomes” meaning “laws”. Today, however, the word is used to describe the science of “designing the environment to fit the person, not forcing the person to fit the environment” (Strangeland, 2011).

According to Grey (1998): “In a small room, focus on your primary kitchen needs and map out the area for the cooker, the sink, and the food preparation. Establish the minimum dimensions you can work within without feeling cramped, and then arrange other appliances and storage around this core” (Grey, *The Complete Home Style Book*, 1998).

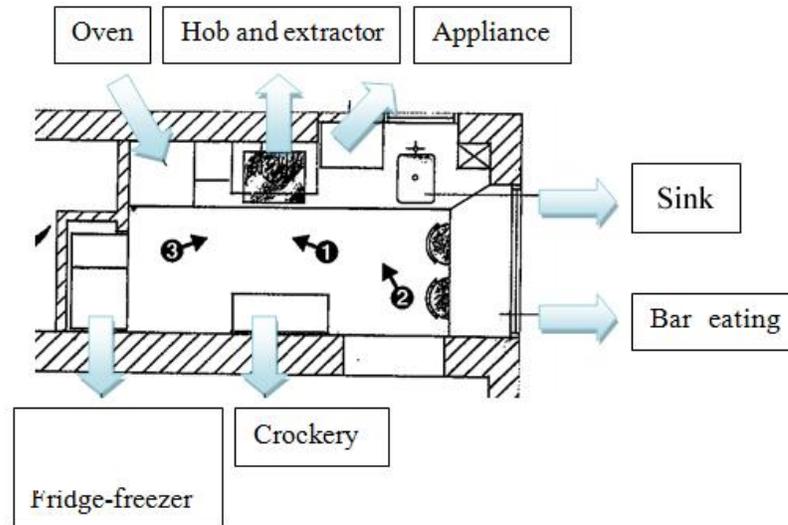


Figure 33: Small kitchen plan, internal room dimensions: 1.9m wide and 4.4 m long: (Grey, 1998)

As shown in Figure 33, two areas have benefited from the natural light seeping through the window which is the sink and the eating area, furthermore, the location of the hob is against the outer wall to make sure there is sufficient ventilation, this shows that in relation to efficiency of kitchen design all the functional spaces including the standard dimensions relation to human figure and components of kitchen are necessary to be considered (Grey, 1998).

In a small space, the closeness of tasks is to be expected; it is important for a user to be able to move around the room freely and without restraint, as shown in Figure 35 (Grey, 1998).



Figure 34: Small kitchen design
(Grey, 1998)

Appliances that are multi-functioned may be a better choice in a small kitchen rather than those with dedicated features that have only a specific use in a small kitchen. The same applies to small gadgets and electrical appliances with specific uses that may occupy more space than they make up for in usefulness. For consideration and focus on specific kitchen needs, we can accumulate a list of kitchen essentials, elements and designs which suit the user in the best way possible (Grey, 1998).

If all necessary requirements of appliances are well placed, the interior space is organized, and the positions of appliances are optimally placed where they are required, it is considered as a well-designed kitchen. As we know the kitchen is a completely different space compared to the other rooms in a house, it is used for preparing and serving meals. In fact, the critical aspect of a kitchen is modifying its environment to fit the user. The aim of ergonomics is to try to make it convenient, comfortable, and more efficient in order to reduce exhaustion by balancing the physical being and the objects around the being which is required to get work done (Strangeland, 2011).

“Ergonomics is another important factor in choosing a kitchen. Ergonomics is the science that studies our interaction with living and work space and the objects we use. A kitchen is the place where a great deal of daily activity takes place: we prepare and cook food and then we eat it. All this is easier if we have everything at hand and we can use it more freely and comfortably without getting tired. But that is often impossible because our kitchen furniture doesn’t meet our physical need” (Vittori , 2011, p. 13). “In theory, the design of the storage spaces (including crockery, dry food items and cold food items), sink (where washing up before and after cooking is done) and hob (for cooking) should be thought out” (Amodularlife, 2011).

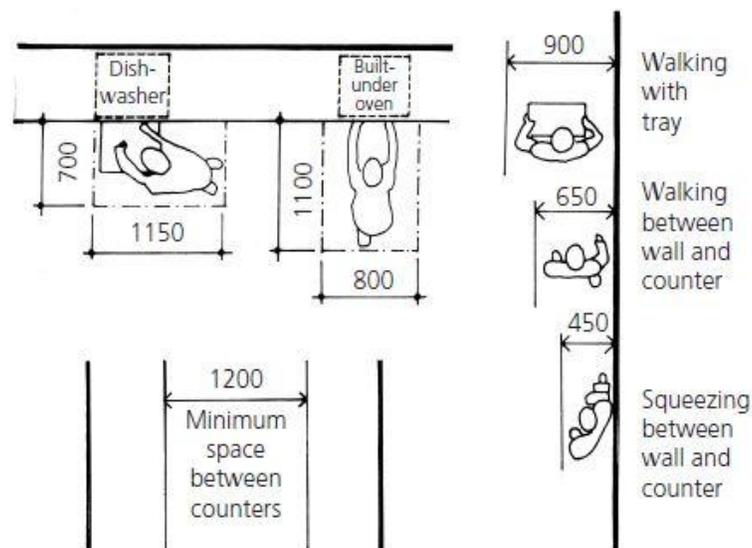


Figure 35 : Key dimensions on plan in a kitchen design (Phillip, Woolhouse, & DeZerega, 2011)

In Figure 35, the minimum dimensions for comfortable spacing is illustrated. A kitchen that houses built-in ovens and dishwashers must have sufficient spacing and the length of the doors that extend outwards should be considered. The minimum dimension for

carrying a tray is 900mm, the minimum space for walking between a vertical surface and a counter is 650mm and to squeeze between them takes a minimum of 450mm (Baden-Powell, 2005).

The result of considering ergonomic issues in a kitchen indicates to the consumer that although there are good common design rules for kitchen design, they are only rules for kitchens in general and can be adapted to fit the needs of different users. Adapting a kitchen design for a particular user is a huge part of the development stage. If the kitchen design is not customized to fit the user's physical character and needs, it will not be comfortable for the users.

2.2.1 Cabinets

It is essential to have an understanding of the height of drawers, cupboards' and shelves as they should not be too high. Having the heights between 750 and 1550mm is ideal for easy access. The maximum upward reach for a female when standing in front of a counter in order to access shelves is between 1950 mm and 2000mm (without worktop support) (Baden-Powell, 2005).

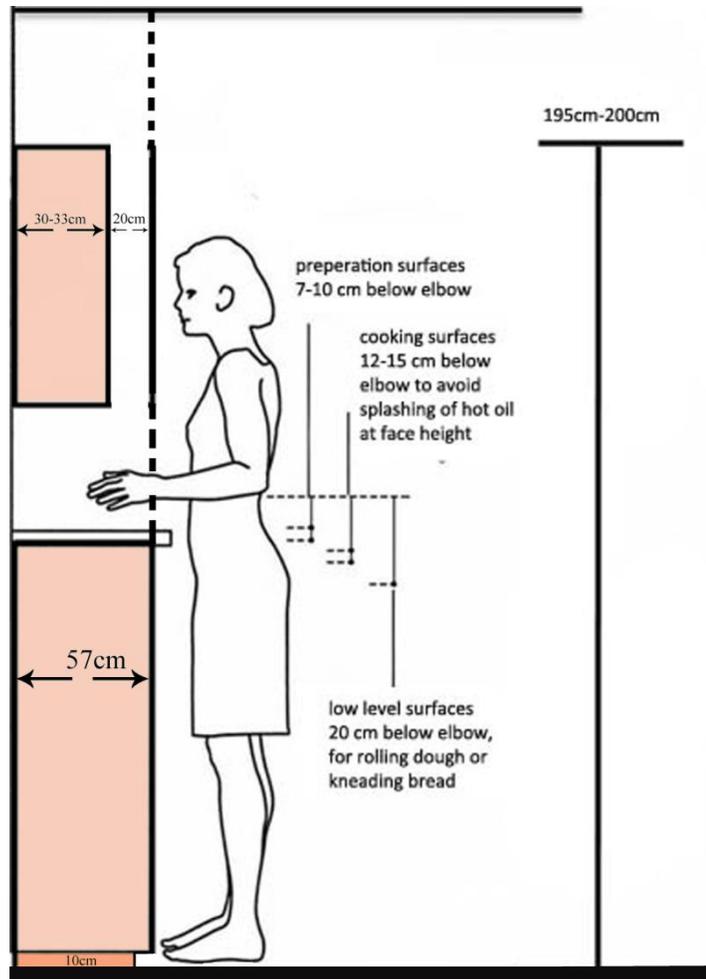


Figure 36: Ergonomic counter heights (URL 2)

A permanent toe indentation at the bottom of all cabinets should be present. It should not be less than 100 mm in height and 75 mm deep. Worktops should always be above knee heights, at least 460 mm wide, 500 mm deep and lower than 150 mm under worktop (Baden-Powell, 2005).

Standard overhead cupboards are 300-330mm deep which is 200mm less than the lower cabinets. Such a design eliminates the possibility of the user hitting his head against the overhead cabinets every time they get close to the work bench (URL 2).

If the user in a kitchen is working on a worktop that is too low or too high, it causes that person to stand in a wrong way for a prolonged time, causing all sorts of problems such as: back pains, neck pains and various spasms throughout the body making them very uncomfortable. As the evolution of humans is ongoing, people are also getting taller, so kitchen tops must be tailor made to fit people with the correct height (URL 3).

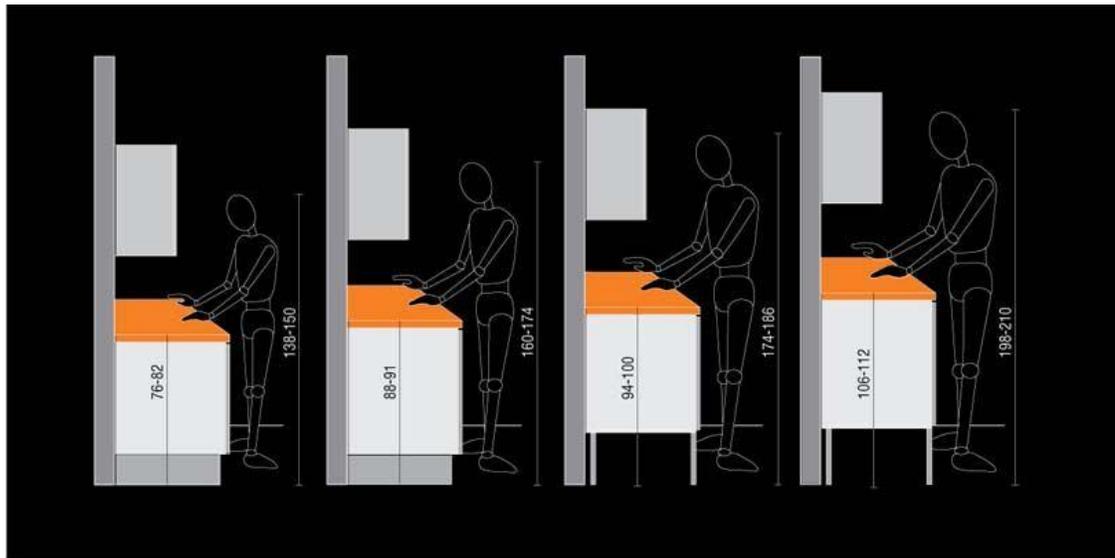


Figure 37: Recommended Worktop Height for Individuals: (URL 3)

2.2.2 Appliances

Ovens and refrigerators are waist-high appliances, which allow for a better view of other equipment; on the other hand, if these appliances are fixed to cabinets, it will constrict the worktop bench. (Baden-Powell, 2005).

Microwave ovens that sit on benches are around 400mm in height which are perfect for users to be able to utilize without any sort of reach issue. Standard ovens are usually much larger than their microwave counterparts with average heights of about 600-700mm. It is recommended to place the ovens a little below the waist so the hot and

heavy food that comes out of the oven is not carried over-head so not to cause any serious injuries such as splashing hot oil to the user (Baden-Powell, 2005).



Figure 38: Various location of oven (Streeter, 2011)



Figure 39: Ideal oven placement (Streeter, 2011)

As it's shown in figures 38 and 39 the placement of oven can differ. In figure 38 (left) the user may have to bend in order to use the oven, and in the same figure on right, it might be too high for the user, therefore figure 39 shows an ideal height according to the user.

Dishwashers are also typically placed below waist height which is around the same height as where ovens are placed. Dishwashers vary in size between 600mm wide by 850mm deep for full size models and 600mm wide and 450mm high for more space-conscious kitchens. (Baden-Powell, 2005).



Figure 40 : Dishwasher Height (URL 4)

Generally there will be an aspiration installed approximately 600 mm (depending on the height of cabinets and user height) above the cooker top, in order to suck in the unwanted smell and smoke

Generally there will be an aspiration installed approximately 600 mm (depending on the height of cabinets and user height) above the cooker top, in order to suck in the unwanted smell and smoke

Built-In hobs are level with the counter top for maximum efficiency. They range in size depending on how many burners are present. 2 burner (minimum) hobs are 290mm and 6 burner (maximum ideal) hobs are around 870mm. (Baden-Powell, 2005).

2.2.3 Accessories

2.2.3.1 Worktop

“Work surfaces can often be an afterthought. Yet worktops are the most visible part of the kitchen and subject to the most punishment. Color and finish must compliment the cabinet fronts, but that is a minor issue compared to whether they can withstand knocks, abrasions, chemical attack, damp, hot pans, cigarette burns and steam. There is no other furniture component that is expected to tolerate so much misuse” (Dickens, 2011).

According to the mentioned studies such as Strangeland; Vittori and by Amodularlife, they indicate that recommended standard height of worktops differs according to the height of the user; therefore the standards could vary in each country. It is more comfortable for a user to use a worktop that is not too high and not too low. When considering the height of the worktop, elderly persons need to be considered in the equation. Elderly people may use the kitchen worktop area and they may require a worktop that is lower than the standard, so it can be considered that a worktop height of around 900mm would be an acceptable height. Meanwhile same process should be considered for disabled, since they may use different utilities, in addition to the efficient space under the worktop for easier approach to sink or cooking worktop.

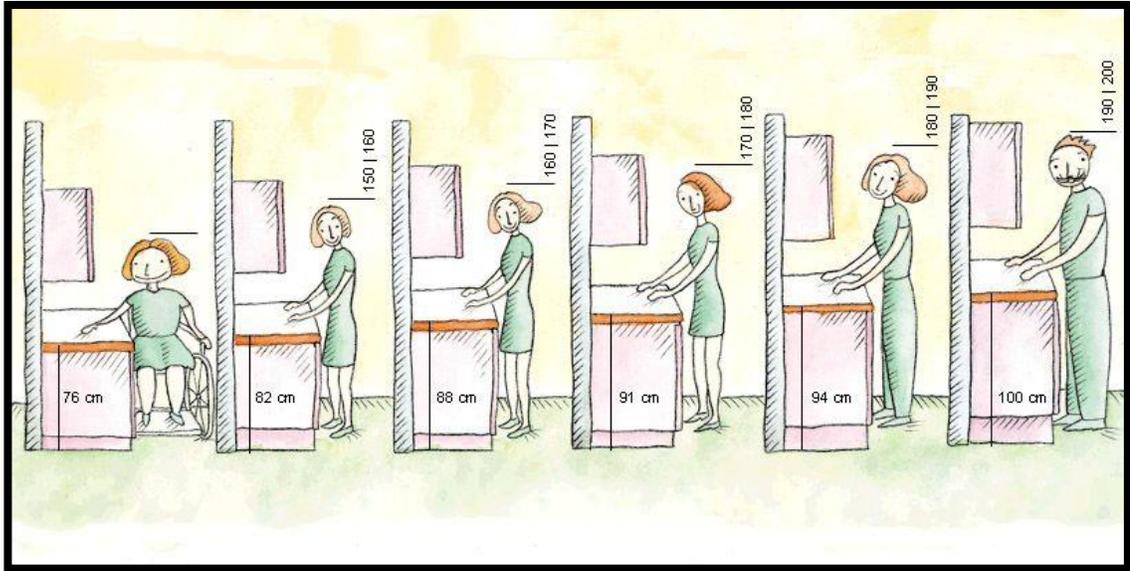


Figure 41: Worktop heights (URL 5)

2.2.3.2 Sink

Kitchen users spend more time at the sink than anywhere else around the kitchen, even around dishwashers and the time it takes for food preparation. It is better if the position of the sink is close to or under a window in direct view of the daylight. If a window does not exist around the sink, it is very disadvantageous (Baden-Powell, 2005).

There are a number of sink types such as single bowl, double bowl and etc, which requires different dimensions. “The standard width of a kitchen sink is 550 mm while its length usually measures 760 mm. This useful fixture usually has two basins that are 200mm deep. Its size varies depending on different factors such as the sink drain position, counter space bowl orientation as well as number of bowls. In addition, its dimensions also depend on the accessories available, some of the most common of which are the soap dispenser, air gap, sprayer and tapings” (URL 6).

2.2.3.3 Cooker

Cookers should not be placed in corners or adjacent to a doorway where the door could swing into the cook, and people may brush past pan handles and cause accidents (Baden-Powell, 2005).

According to Baden-Powell (2005), the position of the cooker should not be under the window where draughts could put out gas flames and even around blinds and curtains where they can catch fire. It is also required to place a fire proof splash back behind the hob. To create functional comfort, there should be minimum distance of 400mm between cooker and return wall in order to provide necessary space for the user, in addition to minimum distance of 600mm between cooker and tall cabinet or another appliance for setting down.

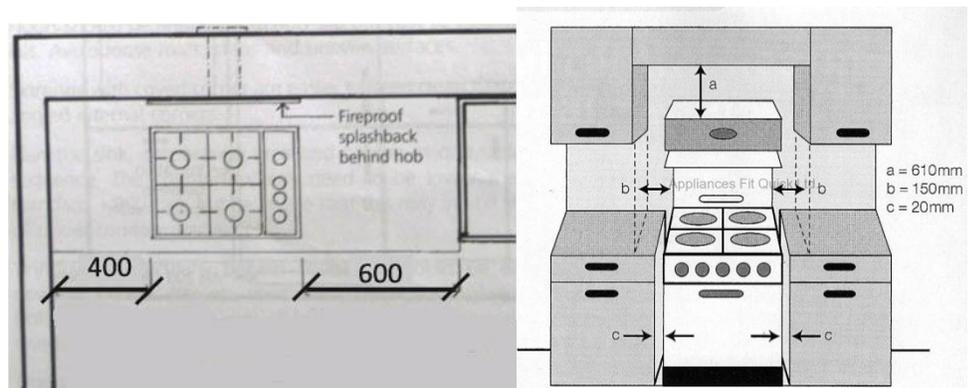


Figure 42 : Positioning of the cooker or hob
Source: (Phillip, Woolhouse, & DeZerega, 2011)

2.2.3.4 Hardware

Hardware can be mentioned as; “Hinges, door flap and lift-up fittings, door and drawer handles, knobs and continuous pulls, catches, stays, worktop edging and cornice

profiles” (Baden-Powell, 2005). Such accessory hole spacing’s, diameters, and lengths vary greatly between 10mm-1m, 10mm-16cm and 15mm-2.5m respectively (URL 7).

Table 1: Hardware dimensions (URL 7)

Hardware	Dimensions
Spacing’s	10mm-1m
Diameters	10mm-16cm
Lengths	15mm-2.5m

2.3 Chapter Conclusion

Careful planning and some helpful ways in designing a small kitchen can bring out the best of it. Although we know that there are many requirements that need to be met in order for the kitchen to be functional, some add-ons such as partition walls can be both functional and decorative (Lee, 1998).

Users can optimize space saving results with clever designs and utilities. As wet and dry areas of the kitchen must be integrated according to the kitchen triangle, space must always be considered when calculating all the variables for maximum user comfort and efficiency.

Chapter 3

TECHNOLOGICAL IMPROVEMENTS IN KITCHEN'S

3.1 Evolution of Kitchen Design

3.1.1 19th century and kitchen design

Cooking Stove

Use of fire for cooking and heating which is believed to date back about 100,000 years (Atalay & Hastrof, 2006) has always been a cornerstone of living spaces. Since ancient or medieval times, the kitchen took on a gathering role until the speculation of domestic spaces (Davidoff, 1995). Prosperous dwellings' evolution was quicker, and as noted, in England, from 16th Century onwards, the hall or large living space was regularly split into sub-spaces (Davidoff, 1995). Change was virtually non-existent in the kitchen as a room, during the times when "domestics" carried out an overabundance of difficult household chores, it remained a large heart in the hall of one or two room houses. At the same time, a few small comforts may have been available in the kitchen (in the form of a rocking chair or colorful dressing on the windows), but in general, the middle-or upper-class owners of large kitchens did not feel the need for improvements of day-to-day kitchen activities. As the industrial revolution boomed, change began to take place in the kitchen, as slavery was abolished, and immigrants and domestics opted for factory and millwork employment, As the 1870s approached, women found themselves with a lot of work to do, especially in the kitchen (Plante, 1995).

Improving technology and applying it to kitchen design made significant changes such as replacing the heart of the kitchen with a cook stove, which can be referred to as one of the first appliances in kitchen design. The creation of the cook stove facilitated the kitchen in positive ways that helped the user with the dissipation of lifting heavy pots and pans for long periods of time. The cook stove brought technology to the kitchen, changed American cookery and meal planning and simultaneously relived the housewife of the difficult tasks of lifting and moving of heavy iron cookware (Plante, 1995).

Since cook stoves became very popular, kitchen appliances became the focus of kitchen design. During the late nineteenth century, by the progressing of the industrial revolution, new gadgets such as cast iron apple peelers, cherry stoners and egg beaters were introduced to the kitchen market.



Figure 43: Cooking Stoves (The Growth of Industrial Art, 1890)

“The tradition of the sociable kitchen is connected with the more prosperous rural families’ hard-working bourgeoisies in towns where a mixture of circumstances required a pragmatic, well organized household that was sufficiently affluent to allow for the luxury of basic comforts but where the families actively used their kitchens and did not rely on an army of servants. This provides us with a parallel situation with today, expect the servants are machines” (Grey, 1994).

The widespread use of the cook stove prompted the introduction of more and more “improved appliances” to the kitchen (Plante, 1995).

Catherine Beecher (1800-1878), American pioneer of rationalized kitchen, suggests a works saving organized kitchen plan by replacing the large kitchen table by concentrated, arranged, interconnected work surfaces that were supplemented with drawers located under them and shelves on the wall” (Sonderegger, 2006).

In her pursuit of a step-saving kitchen, Beecher began with the idea that men’s working spaces were rational, smaller and ergonomically equipped, whereas in domestic kitchens, women’s work was made harder through large and inappropriately organized workspaces (Jerram, 2006). Having obtained clues from steamship galleys (kitchens), Beecher (1843) proposed efficient alternatives to domestic kitchen layouts and fitted furniture which would lead the way to the fitted workshop kitchens.

Meanwhile by growing the American civilization as a pioneer country, the quality of culinary and kitchen development was increased.

Pantry

As the kitchen became more and a more introverted space for one or two people to carry out domestic chores, new designs boasted time-and labor-saving properties. The late nineteenth century pantry was a forerunner of built-in worktops that lined the walls of a kitchen as opposed to centrally placed, freestanding tables (Baden-Powell, 2005).



Figure 44: The late 19th century pantry (Pond, 2007)

At the same time, the kitchen "burdens" were relieved by early inventions and it seemed that logically women had more time on their hands. Cooking was becoming increasingly important at social events where excessive menus and deliberate displays of luxury would be flaunted in front of guests. As more was expected of them, women had to embrace any and all of western consumerism. As the late nineteenth century, while the industrial revolution progressed, convenience rather than necessity became the major incentive for inventing and purchasing labor-saving devices (Plante, 1995).

3.1.2 20th century and kitchen design

Frankfurt kitchen

By improving the kitchen as a single individual space, new ideas were put in, to improve the kitchen design in regards to effectiveness and efficiency.

By applying science and functionality into kitchen design, the process gradually converted the kitchen to be considered as an individual space operating completely separately from the rest of house (Freeman, 2004). The design of kitchens became simpler, concentrating on craftsmanship and attempting to achieve extra focus on functionality (Plante, 1995). Combination of furniture and appliances in kitchen units such as the Frankfurt kitchen designed by Margarete Schutte-Lihotsky was one of the stepping stones towards a modern kitchen (Freeman, 2004).



Figure 45: Frankfurt kitchen (Spechtenhauser, 2006)

In 1920s Frankfurt as one of the various cities being involved in the massive tendency towards low- cost housing, was the birth land of first laboratory kitchen. The idea of Frankfurt kitchen design of Margarete Schutte- Lihotzky was influenced by Le Corbusier famous quote as home as ‘a machine for living’. Therefore she integrated technology into the kitchen to transform it as a machine for preparing meal in (Noblet, 1993).

Refrigerator

During the 1920s and 1930s, the kitchen was alleged to be a unit designed which was small, with all gadgets arranged as efficiently as possible and appropriate for proper cooking or able to perform any preparation related to eating and drinking. Particularly by the end of 1930s, cooking became more important. It wasn't only meant for preparing food at home, but became a field of study and a job afterwards.



Figure 46: On of the firs refrigerators (Sidey, 1972)

The evolution of food industry throughout the 1900's has been a quick one. By invention of electricity and developing technology, first electrical refrigerators and freezers were introduced to the kitchen industry between 1920 -1930's. In addition the innovation of products such as readymade packaged foods, frozen fruits and vegetables as well as pre-made food packages in 1940's had a direct influence on kitchen design (Plante, 1995).

Kitchen Work Triangle

The improvements of the industry and science influenced the design of the kitchen in many different ways. Sometimes, the influence derived from a new type of food or sometimes through innovative tools which assisted the user food preparation and cooking. As a result, kitchen design was improved accordingly, along with science and industry. Neatness, well fitted, and efficient arrangements were the focus of the kitchen market place (Freeman, 2004).

Work triangle in particular, was one of the most important characters which have been developed from 1940's up until now, as a standard connection tool for better circulation and easier access between the three frequently used kitchen areas for the functions of storing, cleaning and cooking (Powell, 1971).

Modernism

As the modern era emerged in the mid-1900s, new industrial appliances, attitudes and processes were introduced to the kitchen transforming the space of pleasure, culture and memory into science and technology based machines (Cowan, 1985).

Kitchen started to be focused on and be further developed which in turn became an important domestic area along with the considerations of economy and efficiency. In particular, the developments helped assist the user with energy saving appliances, time consumptions and the process of cooking itself (Plante, 1995).

The characteristics of kitchens in the 1950s included the following aspects:

- Planned space
- Closed storage areas
- Time saving appliances
- Built-in cupboards
- Work triangle

With the progress of industrialization after 1950's, the kitchen space continues to be the central room in dwellings. As fire was difficult to contain in various rooms at once, single-room housings were constructed (Grey, 1994).

In small kitchens, durable items that present multi-purpose functions were preferred rather than ones that had specific features. The same applied to small gadgets and electrical appliances whose limited purpose may not validate the amount of space they occupy. The room is characterized by the individual elements contained within. In kitchens, these elements must also be functional for the fact that they are used more frequently than other furniture (Grey, 1998).

In the 1970s with the addition of a television unit, kitchen was no longer the center and the focal point of the house (Harrison, 1972).

By improving the domestic storage spaces, cabinetry became more popular, since they helped increase the kitchen space. Even nowadays, cabinetry and appliances are the center of the kitchen market that is focused. Incorporating modernism such as minimalism, simplicity, and sanity with the collaboration of electrical appliances are the concepts of contemporary kitchen designs this development could be the foundation of kitchen design evolution which led towards contemporary kitchen design (Freeman, 2004).

2.1.3 Contemporary kitchens

Today kitchens are the buffer zones or connections between other spaces or functions. There is no more need to head out in order to get a coffee. Kitchens often include a bar or are equipped with espresso or filtered coffee machines. Without a doubt, implying digital and micro-technology into kitchen designs have assisted the user save time and become more efficient and this is another aspect of contemporary kitchen design. Microwave, dishwasher, and coffee machines are such kitchen appliances that enable efficient food preparations (Freeman, 2004) .With the development of the food industry, kitchen spaces gradually become popular places to store processed foods, or to rapidly cook premade food. These individual facts have their influences on kitchen design as well (Pollan, 2006).

Contemporary kitchen design concepts have different characters in today's world. Kitchen design has been under influence, of the consumer food products providing the least preparation time and industry based standards that revolves around them.

Since technological improvements in kitchen components play an important role in the evolution of the kitchen design, it would be necessary to study such a topic.

3.2 Technological improvements in Kitchen Component

Developing technology and implementing a digital lifestyle into the house and the future, creates smart kitchens. These are the kitchens to be, which minimize any additional motion, and in the meantime, focus on the customization and the flexibility, to be well designed and well fitted into any space which does not necessarily have to be a large one. Developing technology and implementing it into a living space is a primary key in terms of development increments and the kitchen becomes one of the main focuses for these innovations.

Along with these improvements, each component of kitchens has been influenced parallel to each other, such as cabinetry, home appliances and accessories.

Therefore, in this research, each category will be investigated individually in order to outline the topic in more detail.

3.2.1 Technological Improvements in Cabinetry

Cabinets are important elements in a kitchen which are being used mostly for storage purposes. They support appliances, help store kitchen accessories such as kitchen knives or cooking pans and are used as a counter top in food preparation. Kitchens are built in a

way that modular components can be selected individually or by the user and can be arranged in a way to fit in the smaller spaces (Bell, 2002).

There is no longer a need to contact carpenters or measure individual spaces, calculate, draw plans or look for a designer. Everything is now prefabricated into packages and displayed in a number of visual communicative ways such as a magazines, e-Magazines, websites, catalogues, online catalogues or in shop windows as display models in order to help the user visualize the dream kitchens that companies are creating for them (Khosrowpour, 1999).

Technology also has influenced the visual aesthetics of the kitchen. Built-in kitchen cabinets help harmonizing the organization and unity of the kitchen and providing a minimal approach. Meanwhile they are extremely functional specially in providing worktop and storage spaces for the smallest food containers to kitchen appliances (Nagyszalanczy, 2005).



Figure 47: Built-in kitchen cabinets (Nagyszalanczy, 2005)

Today along with the improvements of technology, customized cabinets are becoming increasingly popular than modular ones, since one can have the possibility of transforming their imagination into reality in terms of using such as materials, texture, size, visual effects, styles and other design criteria (Madsen & Jefferis, 2004).



Figure 48: Cabinetry design ranges (URL 8)

Technological developments also help create innovative materials which can be quite functional and decorative with various numbers of colors and textures. However the quality and durability also plays an important role in cabinetry materials since there are various factors affecting the surroundings such as cooking smoke, humidity or temperature change. For instance, powder coating technology improves the stain and moisture resistance possibilities and in addition, it provide the possibility of creating different colors which improve the quality of design and help preserve the looks (Hester, Nicholson, & Cassidy, 1990).

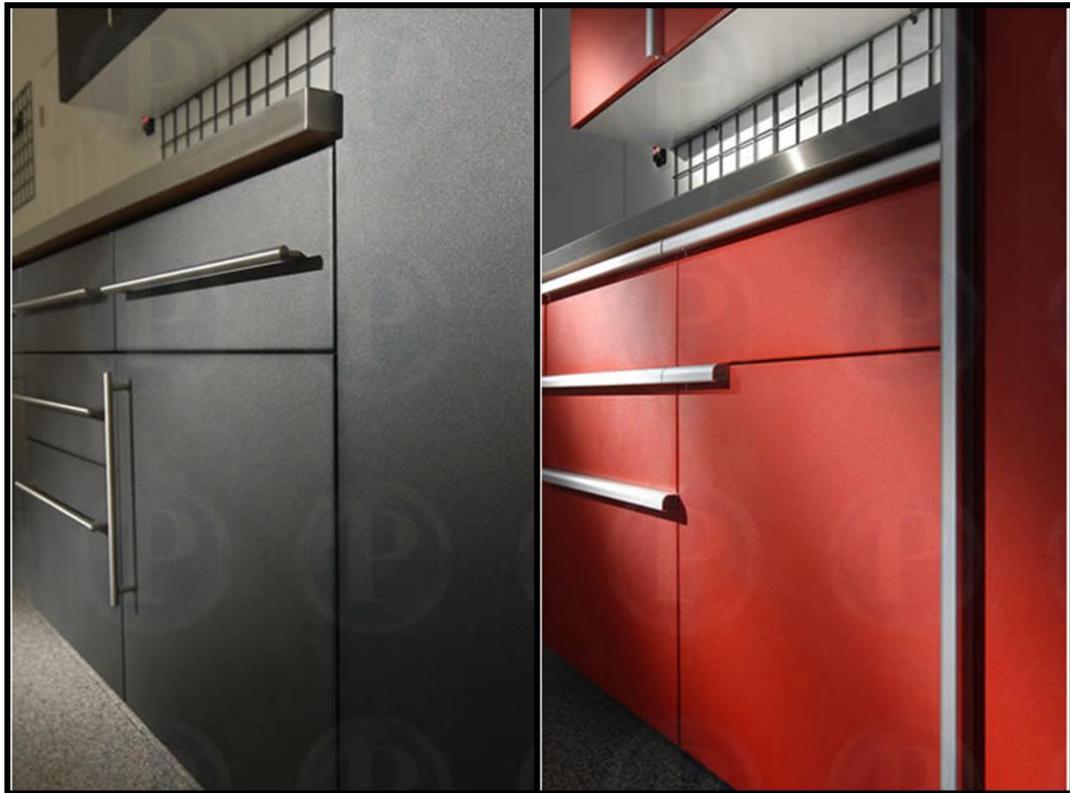


Figure 49: Powder coating in cabinetry (URL 9)

Recent technological advances in refacing Cabinetry could be a very important key aspect in relation to kitchen improvements.

Refurbishing and changing cabinets and hardware as well as installing them could be done easier. In addition, remodeling the kitchen creates a new atmosphere for customers. Cabinetry developments can improve the customization of the kitchen and bring a new contemporary look that can be mixed and matched to suit all tastes (Freeman, 2004).



Figure 50: Cabinetry prefacing (URL 10)

Meanwhile technological improvement increases the variety of choices in Cabinetry construction methods. It could be framed construction such as: Full-overlay, Partial-overlay or full-inset or it can be frameless construction such as base, wall or tall/pantry cabinets. In addition innovative cabinetry design minimizes the dead spaces and increases the functionality of spaces, and improves the quality of designed kitchen (URL 11).

“Framed construction is when the face frame is made up of several pieces of wood that are fastened to the forward edge of the cabinet, framing the cabinet box. The outside edges of the frame are flush with the outside surfaces of the cabinet box whereas the inside portion of the frame extends past the inside edges of the box slightly. The face frame provides some rigidity to the cabinet box, helping it to remain square and sturdy” (URL 11).

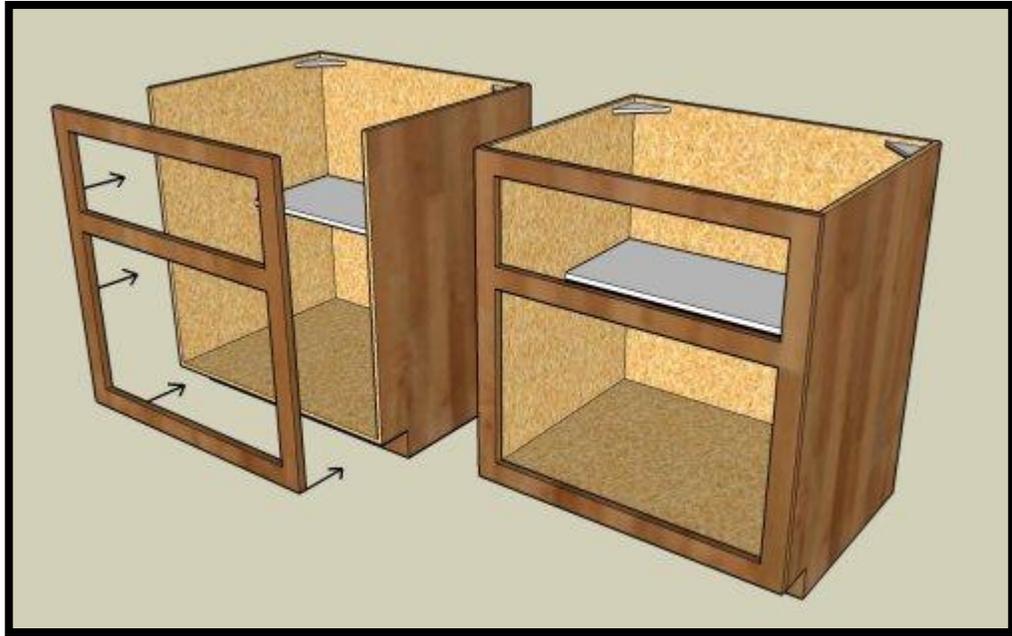


Figure 51: Example of the Basic Structure of a Framed Cabinet (URL 11)

“Frameless cabinets on the other hand offer a bit more accessibility than framed cabinets. This is because there's no inside edge of a frame that's partially blocking the perimeter of the cabinet opening. The amount of storage space in frameless-construction drawers is greater than with framed cabinet construction because the drawer box is bigger for a given cabinet size (in other words, the drawer box has to be smaller on framed cabinets to fit through the face frame opening)” (URL 11).

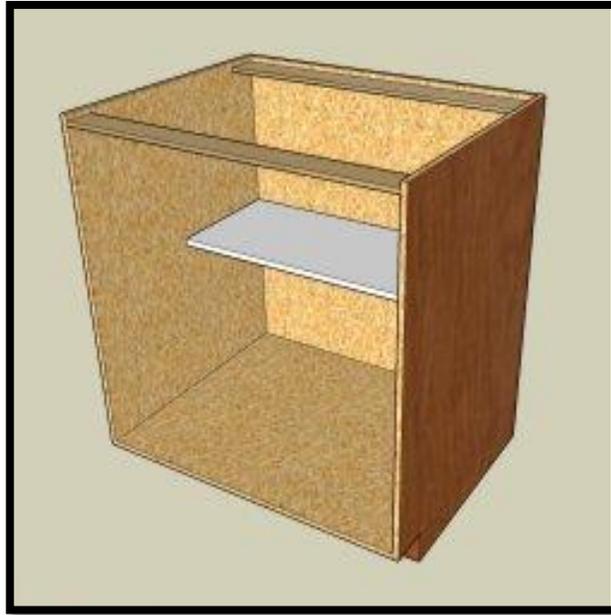


Figure 52: Example of Frameless Cabinet Construction (URL 11)

Energy efficiency, time efficiency, easier and rapid application possibilities as well as aesthetical developments could be the influences of technological improvements in kitchen cabinetry.

3.2.2 Technological Improvements in Appliances

Free standing appliances such as refrigerators, freezers and microwaves are the results of technological developments. There are a large number of kitchen appliances that has already been to the appliance market such as:

- Refrigerators
- Aspirators
- Ovens
- Microwaves
- Cookers
- Dishwashers

- Washing machines (not always in kitchen)
- Fixed Coffee machines and etc.
- Small appliances (movable)

Development of technology influences the design and the innovation of appliances however, contemporary designers are very much concerned about environment friendly issues and energy efficient ideas as well as the globalization of their brand.

According to Joy Schragge, (Consumer Communications Services), a consultant in the appliance Industry, a dream appliance should have the following characteristics:

- User friendly
- Simple operational instruction
- Higher quality
- Less expense
- Environment friendly

Meanwhile each kitchen appliance company is working hard, in competition with other brands and is attempting to provide more ratings and standards.

One of the most important technological influences on housing appliances could be the introduction of the kitchen stove to replace the fireplace which made the kitchen cleaner and safer.

Cooking and cleaning which was done manually, has been improved and automated by utilizing electricity as a labor cutting mechanism which has always been the key feature of a costumer's point of attention, particularly for women. Over the last 40 years, accomplishments in the field of technological cooking and cleaning have been increasing, even in the modest homes.

Today, even in a small kitchen, the number of power driven appliances is increasing in order to eliminate the amount of energy and time spent for cleaning smells and dirt through technological improvements (Freeman, 2004).



Figure 53: Kitchen with appliances (URL 12)

Some samples of future appliances are considered to have the following characteristics. “The appliance must be operable by phone and work and after loading itself properly, a dishwasher or washer captures used water, recycles it, and stores it for re-use. At the end

of a cycle, the dishwasher checks the clean load and puts dishes away, using its programmed memory to store them correctly. The washer transfers its load to the dryer, which dries fabrics to the correct moisture content, then removes load items and folds them or puts them on hangers automatically to meet the user's schedule" (URL 13).

For instance as it is shown in figure 54, a kitchen appliance can be transformable to be used as a flower box, and in the meantime be able to transform to the cooker, by consuming the least space.

Or as it is shown in figure 55, by utilizing the technology, it could be a minimal and multifunctional appliance, eliminating the need for separate appliance, which could be used specially in a small kitchen.



Figure 54: Appliances for Home Interior Design and Creating Future Kitchen Trends (Mikelewis, 2011)



Figure 55: Future kitchen appliances concept (URL 14)

Kitchen appliances are determined to be more multifunctional. Their improvements along with technological advances eases cooking and cleaning, therefore, they can encourage the user to enter and spend less time in the kitchen, while utilizing the appliances. Such multifunctional kitchen appliances, improves the quality of small kitchen design, by avoiding occupied spaces by separate appliances, and providing extra space for other required functions (Lawlor, 2008).



Figure 56: Multifunctional kitchen appliances (URL 15)

With the ever growing demand for globalization, the demand for kitchen appliances is increasing. This could determine two trends for kitchen appliances: “Mass-production or mass-consumption” (URL 13)

Also a number of kitchen tools have been created under the implication of digital technology-led kitchen innovations, which for example can display any food products nutrition if a user swipes the product across it, or a smart screen which is specialized with speakers in order to communicate with them and provide cooking instructions (Olivier, Monk, Xu, & Hoey, 2009).

Producing appliances according to the desires of its users, effective performance and reduction of food infectivity as well as being user-friendly are the main focus of the appliance market in order for a customer to be first pleased with the product, and able to customize the kitchen according to their desire (Shobha & Sidhu, 2011).

3.2.3 Technological Improvements in Accessories

Kitchen accessories are gadgets that come in different sizes which are utilized in the kitchen to assist the user in order to provide efficient results. New technology has its own influences on kitchen accessories as well. It improves the kitchen space organization in order to save space, as well as improving the look, neatness and the hygiene of a kitchen.

There are a number of kitchen accessories that have been created to accomplish the kitchen components such as:

- Air and water treatment systems: heaters, filters, humidifiers, air cleaners, water purifier awnings
- Hand-held tools
- Worktop
- Sink
- Shelves
- Waste grinder
- Plumbing products: faucets, pipes
- Hinges, Pulls and Knobs
- Different type of knives

- Different types of cooking pan
- And etc.



Figure 57: kitchen worktop made of Corian (URL 8)

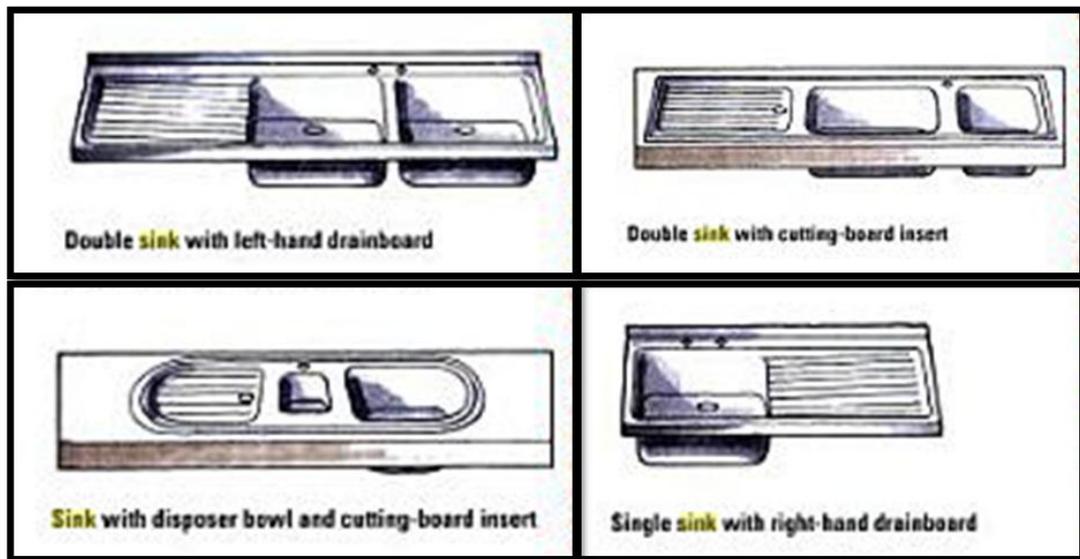


Figure 58: Different types of sinks (Jackson & Day, 2009)



Figure 59: Kitchen shelves (URL 8)

Since technology has direct influence on material development, it helps the user to create different effects and style such as classical in their kitchen. For instance, by invention of Corian kitchen worktops can be variable. “Corian is a composite of natural minerals, pigments and acrylic polymer, which combine together to produce a highly durable and tough material, available in a wide range of colors” (Lyons, 2010).

Also kitchen sinks can be produced in different for different space and different clients (URL 8).

With the recent advancements in cabinetry refacing, cabinet’s hardware’s such as hinges, pulls or knobs also become more versatile and durable yet remain affordable.

Shelves and storing mechanisms passed have created different possibilities such as:

- Tiered shelves for spices and proper size containers for them
- Pull out trays which save spaces in cabinets, since there is no requirement for clearance for access above the stored items.
- Shallow racks holding small containers which can be installed at the back of cabinet doors in order to create faster access to the stored items.
- Hinged shelves and pivots enable them to be opened from both sides
- Rotatable or movable shelves for holding small containers
- Helper shelves which increases cabinet storage capacity
- Slide out bins which can store anything such as serials



Figure 60: Pull out tray shelves (URL 9)

Considering the items which will be stored, there are a number of drawers which differ in width and depth. Adjustable drivers or dish caddices improve the division of kitchen elements. Also sorting dishes with adjustable pegs and pegboards is another type of improvement (Provey, 2007).

New technology and better engineering solutions have created efficiencies and quieter food waste disposal units (Knott, 2011).

The influences of technology on kitchen accessory improvements are implemented in order to create such characteristics for kitchen space quality. Therefore, the kitchen accessories markets attempt to keep these characteristics part of their design procedure.

3.3 Summary of technological developments in kitchen components

Studying through evolution of kitchen design determines a number of achievements which can be summarized in the following table:

Table 2: Integration of technology in kitchen design

Date	Invention	Result
1834	Cooking stove	<ul style="list-style-type: none"> Reducing the tasks of lifting and moving of heavy iron cookware
Late 19 th century	Pantry (Invention of Electricity)	<ul style="list-style-type: none"> Increasing kitchen organization Time efficiency Built-in worktops
1920	Frankfurt kitchen	<ul style="list-style-type: none"> Combination of furniture and appliances in kitchen units Concentrating on craftsmanship Attempting to achieve extra focus on functionality
1920 -1930	Refrigerator	<ul style="list-style-type: none"> Keeping food longer Hygienic Creation of readymade packaged foods, frozen fruits and vegetables as well as pre-made food packages
1940	Kitchen Work Triangle	<ul style="list-style-type: none"> better circulation Easier access between the three frequently used kitchen areas for the functions of storing, cleaning and cooking
1950	Industrialization	<ul style="list-style-type: none"> Planned space Closed storage areas Time saving appliances Built-in cupboards Work triangle
1970	Invention of T.V	<ul style="list-style-type: none"> Kitchen lost its focal character
2000	Digital Technology and Smart kitchens	<ul style="list-style-type: none"> Customization Flexibility Increasing kitchen tools and appliances Communicating kitchen

Along with the development of technology, kitchen components as part of these advancements have influenced the kitchen space and design in more than one way.

These influences have created innovative products that changed the way users interact with the kitchen. These products can be divided into three main groups in regards to kitchen.

- Cabinetry
- Kitchen appliances
- Accessories

Although these influences have different profound effects on production results and their particular achievements, the general aim of these productions have remained the same.

Energy efficiency, time, space and labor saving, organization and many other aspects varying between rapid growth and what is so called a modern lifestyle are the main concepts of user attractions and kitchen component markets. According to the studies which have been done in this research, a number of aspects are defined, which are related to technology in the kitchen design. These aspects are as follows:

- Style and Aesthetics
- Sustainability
- Efficiency
- Technology

Therefore the case studies will be analyzed according to the determined aspects.

Chapter 4

ANALYSIS OF WEBSITES OF DIFFERENT KITCHEN COMPANIES IN TERMS OF TECHNOLOGY

4.1 Methodology of Analysis

For the purpose of this study, 141 kitchens, related companies including cabinetry, appliances and accessory manufacturers that have attended the Milan Fair of 2011 are scanned through their websites. These companies are located in different countries all over the world, providing a variety of products that range according to different aspects of kitchen design. Therefore, each company's website has been investigated individually and the selected companies are classified according to three different production categories:

- Cabinetry
- Home Appliances
- Accessories

Through the investigation, the most frequent countries which appear to have more kitchen companies in the fair are determined. These tables showing the classification of companies are given in the appendix. (Appendix A). The most frequently appearing four countries in all categories are listed below:

- Germany
- Italy
- USA
- UK

In the next step, from each individual country, three manufacture users are randomly selected in order to be analyzed in detail. The random selection process was achieved by selecting companies which produce more than one category of cabinetry, home appliance and accessories for kitchen design

Table 3: Selected Cabinetry brands from four frequent countries

Cabinetry				
Most Frequent Countries		Germany, Italy, USA, UK		
Country	Country Num. 1:	Country Num. 2:	Country Num. 3:	Country Num 4:
	Germany	Italy	USA	UK
Company 1:	ALNO AG: http://www.alno.de/ (App. 2)	Arclinea: http://www.arclinea.it (App.5)	Elkay: http://www.elkay.com/ (App. 12)	Gower: http://www.gower-furniture.co.uk/ (App. 14)
Company 2:	Pronorm: http://www.pronorm.de/ (App. 24)	Boffi: http://www.boffi.com/ (App.9)	Merillat: http://www.merillat.com/ (App.19)	Magnet: http://www.magnet.co.uk/ (App.18)
Company 3:	Poggenpohl international: http://www.poggenpohl.de (App. 22)	Arredamenti Morgana : http://www.arredamentiorgana.com/ (App.6)	Poliform: http://www.poliform.it/ (App. 23)	KrafMaid: http://www.kraftmaid.com/ (App. 17)

Table 4: Selected Home Appliance brands from four frequent countries

Home Appliances				
Most Frequent Countries		Germany, Italy, USA, UK		
Country	Country Num. 1:	Country Num. 2:	Country Num. 3:	Country Num 4:
	Germany	Italy	USA	UK
Company 1:	AEG: http://www.aeg.de/ (App. 1)	Arca Cucine: http://www.arcacucine.it/ (App. 4)	Whirlpool: http://www.whirlpool.com/ (App. 27)	Magnet: http://www.magnet.co.uk/ (App.18)
Company 2:	Bosch Appliances: http://www.bosch-home.com (App. 10)	Ilve: http://www.ilve.it (App. 16)	Miele: http://www.miele.com (App. 20)	Neff: http://www.neff.co.uk/ (App. 21)
Company 3:	Gaggaenau: http://www.gaggenau.com (App. 13)	Composit: http://www.composit.it (App. 11)	Sharp: http://www.sharpusa.com/ (App. 25)	Kraftmaid: http://www.kraftmaid.com/ (App. 17)

Table 5: Selected Accessories brands from four frequent countries

Accessories				
Most Frequent Countries		Germany, Italy, USA, UK		
Country	Country Num. 1:	Country Num. 2:	Country Num. 3:	Country Num 4:
	Germany	Italy	USA	UK
Company 1:	ALNO AG: http://www.alno.de/ (App. 2)	Alpes Inox: http://www.alpesinox.com (App. 3)	Bates and Bates: http://www.batesandbates.com (App. 7)	Gower: http://www.gower-furniture.co.uk/ (App. 14)
Company 2:	Pronorm: http://www.pronorm.de/ (App.24)	Arredamenti Morgana: http://www.arredamentimorgana.com/ (App. 6)	Blanco America: http://www.blancoamerica.com (App. 8)	KrafMaid: http://www.kraftmaid.com/ (App. 17)
Company 3:	Grohe: http://www.grohe.com/ (App. 15)	Snaidero: http://www.snaidero.it/ (App. 26)	Elkay: http://www.elkay.com/ (App. 12)	Magnet: http://www.magnet.co.uk/ (App. 18)

In order to be able to produce an evaluation in more detail, all these companies' websites were scanned through determined aspects which were mentioned in previous chapter to investigate the role of technology in kitchen design.

Three matrices are formed in order to analyze the determined keywords for randomly selected kitchen companies. These matrices separately analyze keywords for each category: cabinetry, home appliances and accessories.

As mentioned before three tables are created to analyze each selected company according to particular keywords in relation to the categories of cabinetry, home appliances and accessories.

These tables illustrate the result of the keyword evaluations in relation to each particular website of each company. The crosses (x) visualize the existence of each keyword. In addition, by counting the crosses, the frequency of keywords is determined. Therefore, an individual chart for each category has been created. From the ratios of each matrix bar, these charts are derived, clearly demonstrating the most frequently appearing keywords.

4.2 Evaluation of selected companies according to keywords

Analysis and scanning the websites through the key words, determined the fact that company websites define a number of key aspects which are the sub category of the selected keywords. Therefore in order to have a better understanding of keywords and a more healthy result on their evaluation, as the number of sub keyword is more than just a few, the ones with similar topics or closer meanings have been classified under the determined keywords from the research.

Each company has not only been evaluated through these sub keywords, but has been classified according to the studies which have been done through the previous chapters, in order to obtain the frequency of the group of keywords to have a more reliable result.

This result could demonstrate which classification has been more or less frequently appearing in each category.

These companies define these main aspects and their meaning by following sub heading which has explained and classified as follows:

Style and Aesthetics:

- **Minimal design:** “A clear , simple, functional design free of unnecessary accessories and decorative elements” (Snaidero, 2012)
- **Modern design:** “Creating latest conceptual ideas and designing kitchen, plus providing costumer with recent technological advantages in an open plan living plus dining room” (Snaidero, 2012)
- **Beauty:** “looking best, being trendy” (Merillat, 2012)
- **Classical:** “A relaxed interpretation of formal traditional, offering the elegance of classical design with a practical twist. Classically inspired details are less ornate and combined with a variety of materials and finishes to create an atmosphere that’s sophisticated without being stodgy” (Merillat, 2012)
- **Contemporary:** “The style is flexible and functional, with an eclectic mix of styles and materials that blend "hip" and "home." (Merillat, 2012)

Efficiency:

- **Emphasizing comfort:** “quick access, ease and organization” (Merillat, 2012)
- **Ergonomic:** “Everything in the right place, every function matching performance. Accessory, worktop and appliance positioning stems from careful research to make work easy, while improving visibility and movement. Easy-to-grasp” (Arclinea, 2012).
- **Functionality:** “Innovative products delivering unique performance” (Arclinea, 2012).
- **Flexibility:** “Architectonic solutions to fit the space, the kitchen components occupy, multifunctional, in addition to careful design in order to organize available space in the best possible way” (Arclinea, 2012).

Durability:

- **Strength:** “Built from high quality materials, accurate production process, well craftsmanship” (Kraftmaid, 2012).
- **Reliability:** “high quality ,costumer being capable of counting on them in long term period” (Bosch- Home appliance, 2012)
- **Longevity:** “Long term life, high quality, resistant materials” (Pronorm, 2012).
- **Resistance:** “Stability and high resistance toward different conditions’ (Merillat, 2012)
- **Durability:** “careful selection of materials and finished products, longer duration of guarantee, carrying out tests to qualify the latest production” (Neff, 2012).

Sustainability:

- **Sustainability:** “Producing kitchen components in respect to environmental cleanliness” (Snaidero, 2012).

Technology:

- **Innovation:** Manufacturing and designing new products plus adapting businesses in order to supply the varying requirements of customers (Elkay, 2012)
- **Creativity:** “Being playful with material and colors, finding inspiration and bringing in styles that may not initially match, but still complement to each other” (Arclinea, 2012).
- **Technology:**” Creating unique, top quality projects along with the most recent inventions and innovations” (Snaidero, 2012).

4.2.1 Evaluation of Selected Cabinetry Companies In Terms of Keywords

The following matrix visualizes the results of the classification of keywords in relation to accessories.

Table 6: classification of keywords in relation to cabinetry

Cabinetry		Most Frequent Countries:														
		Germany			Italy			USA			UK			Frequency of sub-keywords		Frequency of keywords
Category	Country: (keywords)	ALNO AG	Pronorm	Poggenpohl international	Ardinea	Boffi	Arredamenti Morgana	Elkay	Merillat	Poliform	Gower	Magnet	KraftMaid	Frequency of sub-keywords		Frequency of keywords
Style & Aesthetics	•Contemporary	—	x	x	—	x	x	—	x	x	x	x	x	9/12	11/12	
	•Classical	—	x	x	—	x	x	—	x	x	x	x	x	8/12		
	•Beauty	x	x	x	—	—	x	x	x	—	—	—	x	8/12		
	•Modern design	x	x	x	—	—	x	—	—	—	—	—	x	5/12		
	•Minimal design	x	—	—	—	—	x	—	—	—	x	—	x	4/12		
Efficiency	•Flexibility (Modularity)	x	x	—	—	x	—	—	—	x	—	x	x	6/12	12/12	
	•Comfort	x	—	x	x	x	x	—	—	—	x	x	x	8/12		
	•Ergonomic	x	x	—	x	—	—	—	x	x	x	x	x	8/12		
	•Functionality	x	x	x	x	—	—	x	x	x	—	—	x	8/12		
Durability	•Resistance	x	x	x	x	—	—	—	x	x	—	—	x	7/12	9/12	
	•Longevity	x	x	x	x	—	x	—	—	—	—	x	x	6/12		
	•Strength	x	—	x	x	—	—	x	x	—	—	—	—	5/12		
	•Reliability	x	x	—	x	—	—	—	—	x	—	—	x	5/12		
Sustainability	•Sustainability	x	x	x	x	x	—	—	—	x	x	x	x	9/12	9/12	
Technology	•Technology (Smart Design)	x	x	x	x	x	x	x	x	x	x	x	x	12/12	12/12	
	•Creativity	x	x	x	x	x	—	—	—	x	x	x	x	9/12		
	•Innovation	x	—	x	x	x	x	x	—	x	—	x	x	9/12		

This matrix shows the frequency of sub-keywords. According to the table, the most frequent sub-keyword is “Technology” whereas the least frequent one is “Minimal design”. This result is shown in the last column of the matrix.

The following chart visualizes the result of the analysis and the evaluation of classified group of keywords in terms of cabinetry.

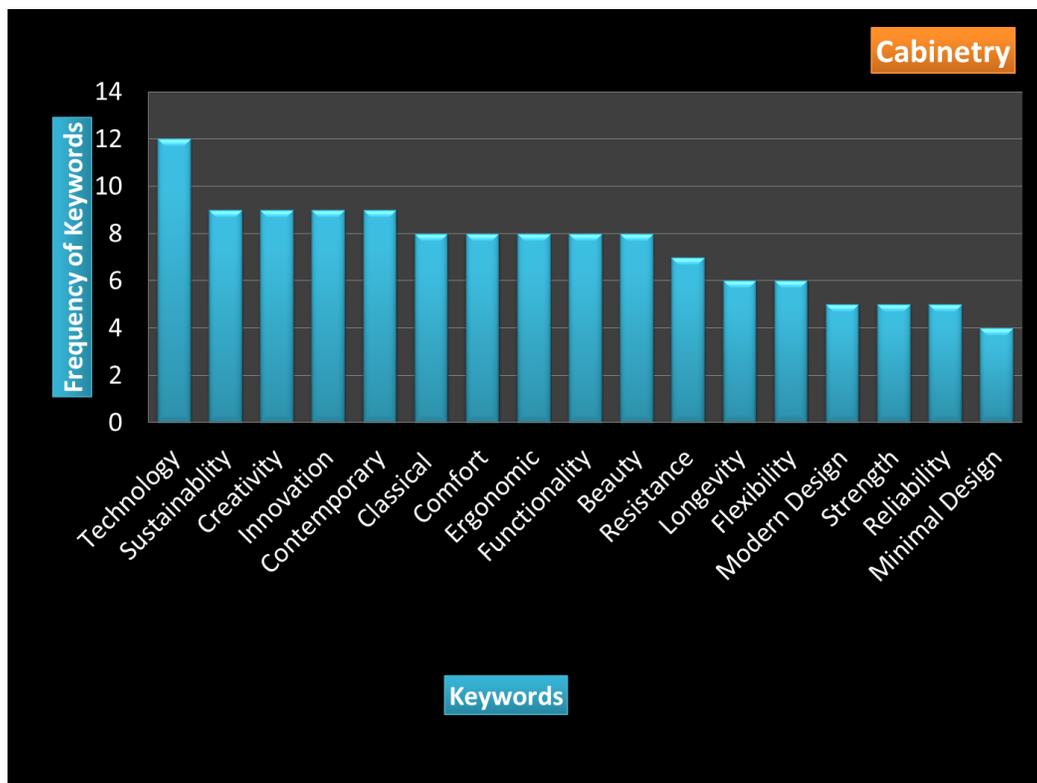


Chart 1: The frequency of appearing keywords in terms of Cabinetry

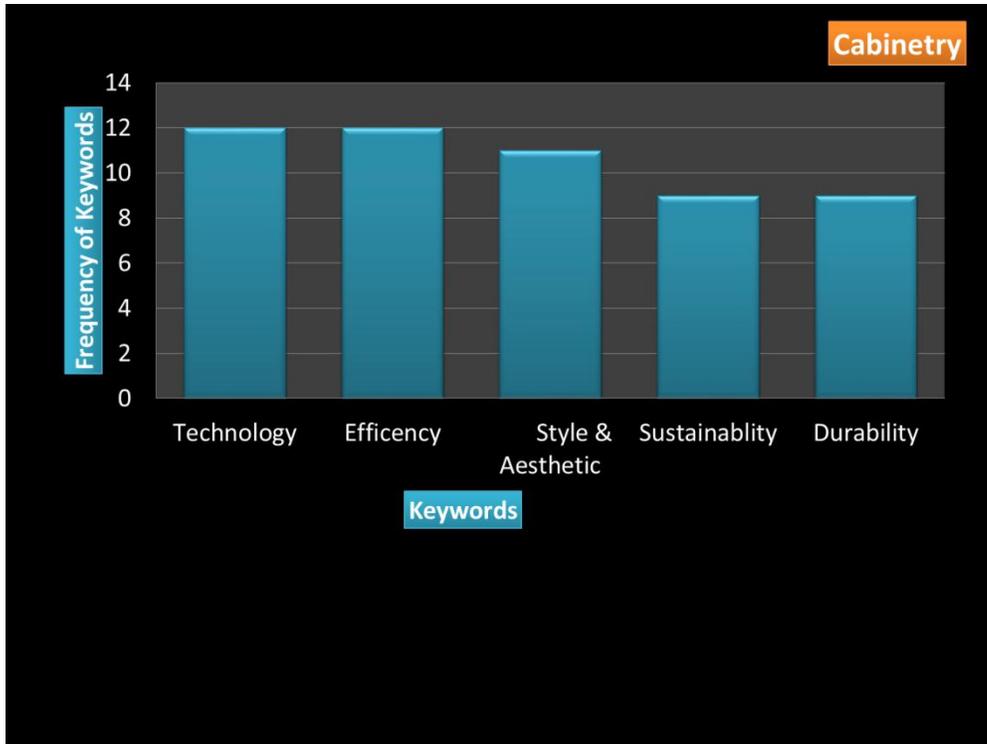


Chart 2: The frequency of keywords in terms of cabinetry

This matrix shows the frequency of keywords. According to the table, “Efficiency”, and “Technology” are the highest and “Sustainability” and “Durability” are the least.

Table 7: The most and the least frequently appearing keyword in ascending order

Most frequent keyword	Least frequent keyword
Technology	Minimal design

4.2.2 Evaluation of Selected Home Appliances in Terms of Keywords

The following table illustrates the comparison and the evaluation of Home appliance companies in accordance with the selected keywords. The keywords are derived from the promotion websites of these brands.

Table 8: classification of keywords in relation to home appliances

Home Appliances		Most Frequent Countries:														Frequency of keywords
		Germany, Italy, USA, UK														
Category	Country: (Keywords)	Germany			Italy			USA			UK			Frequency of sub-keywords		
		Bosch Appliances	AEG	Gaggenau	Arca Cucine	Composit	Ilve	Whirlpool	Miele	Sharp	Magnet	Neff	Kraftmaid			
Style & Aesthetics	•Beauty	x	x	x	x	x	x	—	—	—	—	x	x	8/12		
	•Minimal design	—	—	x	—	—	—	—	—	—	—	—	x	2/12		
	•Modern design	x	x	x	x	x	—	x	—	—	x	—	x	8/12		
	•Classical	x	—	—	x	x	—	—	—	—	x	—	x	5/12		
	•Contemporary	x	—	x	x	x	—	x	—	—	x	—	x	7/12		
Efficiency	•Functionality	x	x	x	x	x	x	x	x	x	—	x	x	11/12		
	•Flexibility	x	—	x	—	—	—	x	—	—	x	—	x	5/12		
	•Ergonomic	x	x	x	x	x	—	x	—	—	x	x	x	9/12		
	•Comfort	x	x	x	x	—	—	x	x	x	x	—	x	9/12		
	•Longevity	x	x	x	x	x	—	x	x	x	—	x	x	10/12		
Durability	•Strength	x	x	x	x	—	x	x	—	—	—	—	—	6/12		
	•Resistance	x	x	x	x	—	—	—	—	—	x	x	x	6/12		
	•Reliability	x	x	x	—	x	—	—	—	—	—	—	x	5/12		
Sustainability	•Sustainability	x	x	x	x	x	—	—	x	x	x	x	x	10/12		
Technology	•Innovation	x	x	x	x	x	x	x	x	x	x	—	x	11/12		
	•Technology	x	x	x	x	x	x	x	x	x	x	x	x	12/12		
	•Creativity	x	x	x	—	—	—	—	—	—	x	x	x	6/12		

This matrix shows the frequency of keywords. According to the table, the most frequent keywords are “Technology”, whereas the least frequent one is “Minimal design”. This result is displayed in the last column of matrix.

The following chart visualizes the result of the analysis and the evaluation of the keywords in term of home appliances.

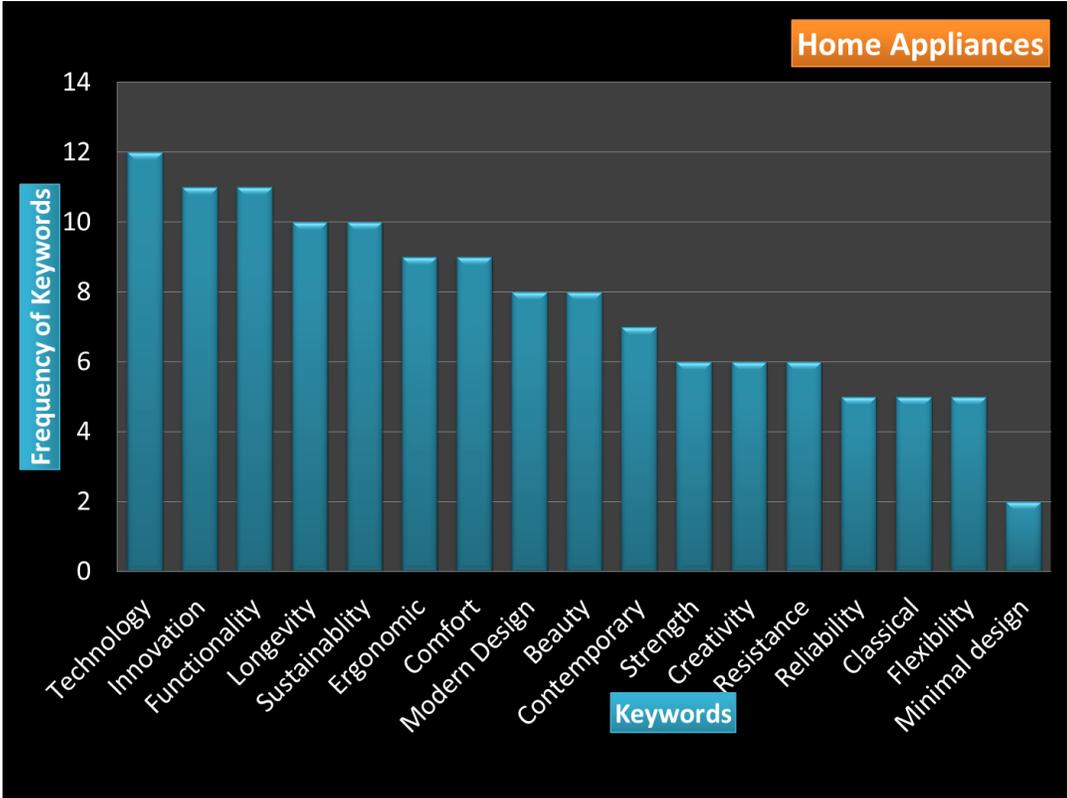


Chart 3: The frequency of appearing keywords in terms of Home Appliances

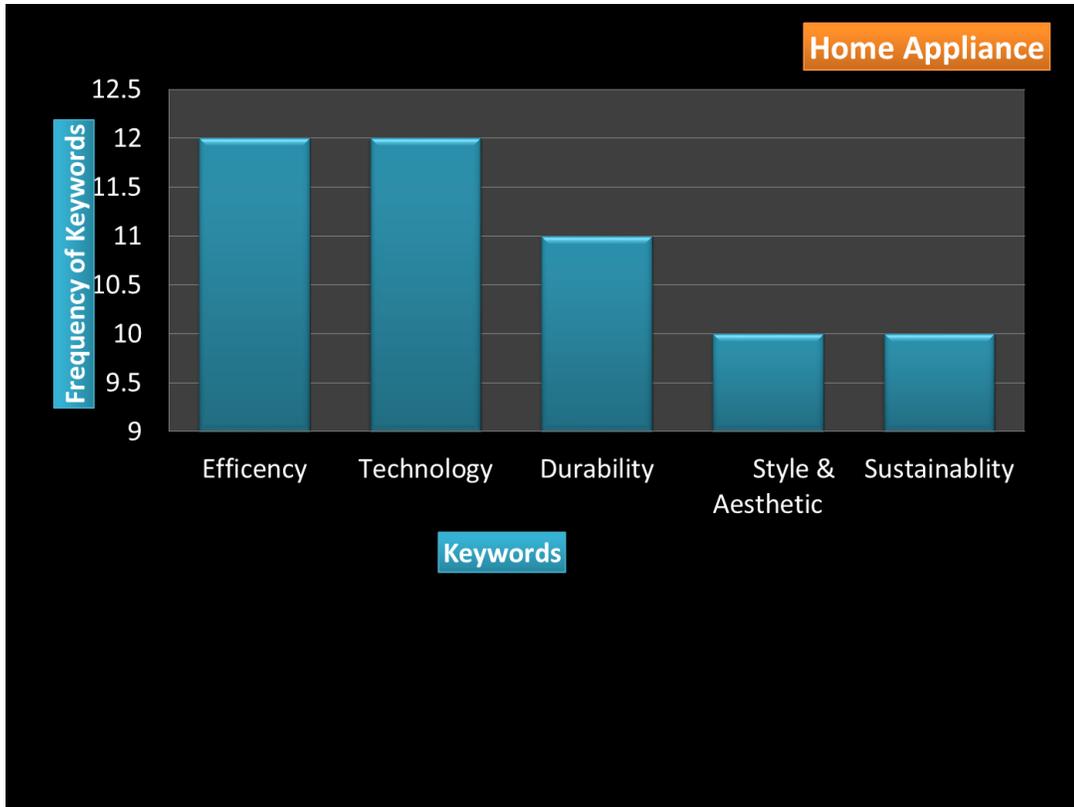


Chart 4: The frequency of keywords in terms of home appliances

This matrix shows the frequency of keywords. According to the table, “Efficiency” and “Technology” are the highest and “Style & Aesthetic” and “Sustainability” are the least.

Table 9: The most and the least frequently appearing keywords

Most frequent keyword	Least frequent keyword
Technology	Minimal design

4.2.3 Evaluation of Selected Accessory Companies in Terms of Keywords

Following table demonstrates the comparison and the evaluation of companies in the accessories category.

This matrix shows the frequency of keywords. According to the table, the most frequent keywords are “Technology”, whereas the least frequent one is “Reliability”. This result is displayed in the last column of matrix. The following chart visualizes the result of the analysis and the evaluation of the keywords in term of home appliances.

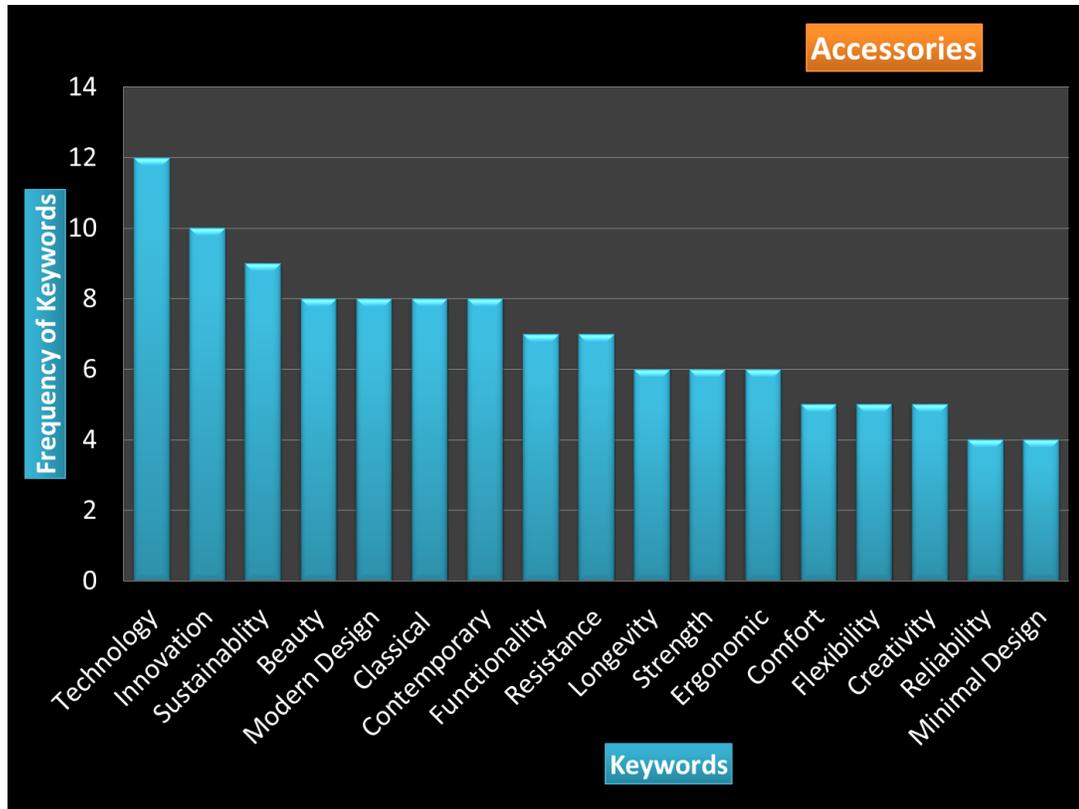


Chart 5 : The frequency of appearing keywords in terms of accessory

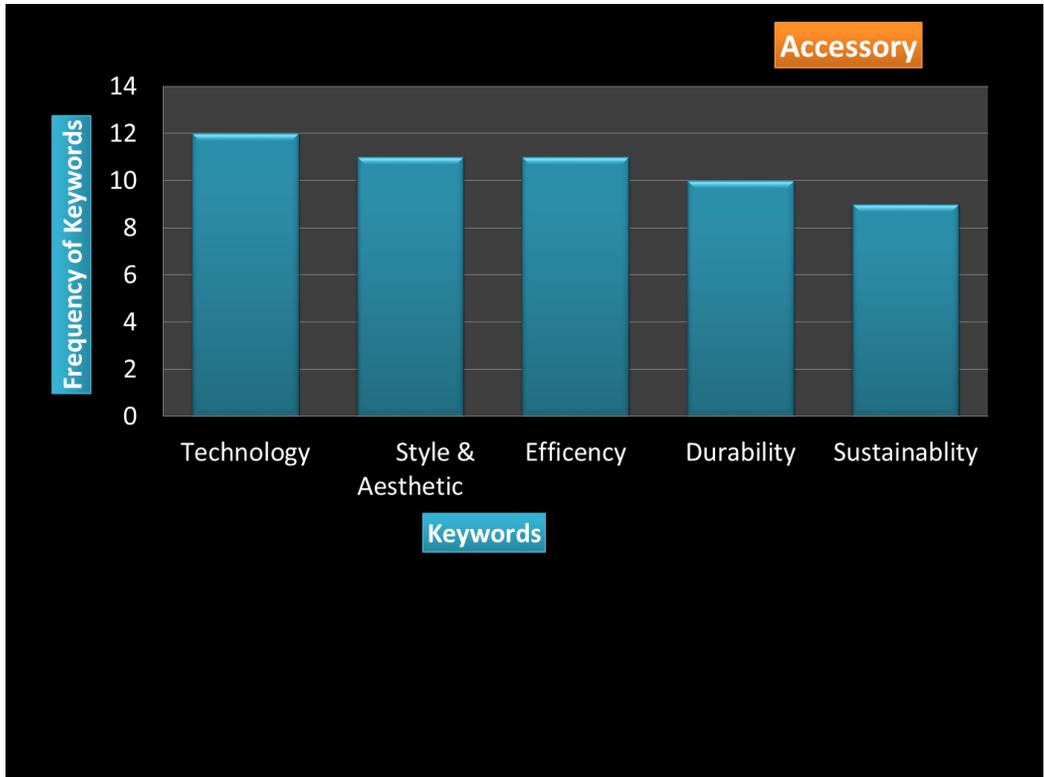


Chart 6: The frequency of keywords in terms of accessories

This Matrix shows the frequency of keywords. According to the table “Technology”, is the highest and “Sustainability” is the least frequently occurring.

Table 11: The most and the least frequently appearing keyword in ascending order

Most frequent keyword	Least frequent keyword
Technology	Minimal design Reliability

4.3 Discussion of results

The analysis, comparison, classification and the evaluation of the companies through the mentioned keywords have brought up the following results:

Cabinetry

In this category the most frequent group of keyword is “Technology” and “Efficiency”, whereas the least frequent one is “Durability” and “Sustainability”. This could imply the fact that consideration of these keywords in relation to cabinetry is not in balance. Since “Sustainability” in cabinetry hasn’t mentioned as much as Technology which may imply that technology is in a greater focus.

Table 12: The most and the least frequent group of keywords for Cabinetry

Most Frequent Keywords	Least Frequent Keywords
Technology	Minimal Design Reliability



Figure 61: Examples of company kitchens in Cabinetry retrieved from selected Company websites (Arclinea, 2012)

Home appliances

In this category the differences between the ratios of frequency of group of words are even more than other category. The difference between keywords is a lot in comparison to other categories. The most frequent group of keyword is “Technology” and “Efficiency” whereas the least frequent one is “Style & Aesthetic” and “Sustainability”, which implies the least consideration as well as other two categories.

Table 13: The most and the least frequent group of keywords for Home Appliances

Most Frequent Keywords	Least Frequent Keywords
Technology Innovation Functionality	Minimal design



Figure 62: Example of Home appliances retrieved from selected Company websites (Pronorm, 2012)

Accessories

The classification of group of keywords demonstrates that the most frequent group of keywords is equally, “Technology” and “Efficiency”, whereas the least frequent one is “Sustainability”. Looking at ratios, demonstrates the fact that there are differences. This could imply the fact that these companies in relation to accessory have more focus on “Technology” as much as “Efficiency” which may include creativity and innovation. In return sustainability could be a component which requires more attention by the companies.

Table 14: The most and the least frequent group of keywords for accessories

Most Frequent Keywords	Least Frequent Keywords
Technology	Minimal design
Innovation	Reliability



Figure 63: Examples of Accessories retrieved from selected Company websites (Neff, 2012)

Discussion:

As it's shown in the tables, the most frequent keywords in one category could be the least one in another category. However such keywords as Technology and innovation are in the first or second order, which demonstrates the fact that, today kitchen design and kitchen components developments are in great focus of utilizing technology and creating new products in order to satisfy the costumers while keeping them updated with the recent contemporary life style.

On the other hand keyword “Technology” has been the top of the list of each kitchen component evaluation and the most frequent one.

Meanwhile it is interesting how “Technology” has been the most frequent repeated keyword in each individual category. Which could imply the fact that how important and essential is the role of technology and its development in kitchen components.

Along with development of technology, kitchen components are progressing towards creating a better and easier life in order to save time and afford.

On the other hand “Sustainability” in some cases is not as frequent as technology keyword being used. This fact does not imply that technology plays a more important role in kitchen industry and sustainability the least.

In addition being the least frequent keyword per say in the company website, does not prove of the fact that particular aspect has been ignored or left behind in the process. It may show the amount of consideration and focus of a company in compare to other ones.

Each keyword solve a part of design process, therefore each is required to be considered individual and in tolerance with others. Such great focus on this keyword could be the implication of achieving the most well designed kitchen components in kitchen industry by companies, and moreover, attracting the consumer and increasing the popularity of such brands.

Chapter 5

CONCLUSION

Today, kitchen plays a vital role of the home. It is where family gatherings happen and where space is allocated for cooking and eating. The designs of such kitchens have been improved in order to meet the standards and demands of today. So many improvements have been implemented yet some kitchens still do not take into consideration the different variety of users, functions and efficiency. When such kitchens were deployed with the considerations at hand, unfortunately they could not be commercialized due to the low demand and the aspects not being transferred to others. Kitchen designs went through other changes such as the physical aspects e.g. Counter top adjustment. Such kitchens focus too much on the physical aspect that they ignored the technological aspect of the kitchen in order to maximize kitchen accessibility.

Kitchens have become the center of the house in most cultures where people gather and use the space for conversing whilst the children freely roam throughout. The kitchens purpose has shifted from being solely dedicated for cooking. Since the purpose has shifted in order to serve multiple functions. Care must be taken to analyze the specific purpose of the kitchen and not fall into the trap of fitting the kitchen with attractive appliances, cabinets and other fittings that don't fulfill the needs of its user.

Integrating functional requirements into a kitchen design makes the space pleasant to be in. before the analysis of such needs; kitchens must be studied in retrospect to understand the evolution contemporary and modern kitchens. The situation created by looking back to the beginnings of kitchen design is to observe the changes that modern technology has presented to the kitchen space.

The question that should be observed is how the advancements in technology affect the housings of today in contemporary kitchens including their components. When technology is created for the kitchen space, a vital factor is disregarded which is the fact that such domestic spaces are occupied by people who utilize the space. In order for technology to be integrated into the space, it is essential for such technology to be controlled and used in an efficient manner in order to fully benefit its users.

Kitchen components must be oriented functionally so that they can provide the maximum accessibility, efficiency of storage spaces which all add up to the meaning of ergonomics within the kitchen.

Ergonomics not only saves time but also reduces effort by eliminating unnecessary actions that need to be taken to get the job done.

The aim of this is to demonstrate the relationship between kitchen design and technology by questioning the role of technology in the efficiency of small kitchens through ergonomic

A primary key for innovation is the development of technology and the implementation of such technology which is the main focus of the kitchen design. Kitchen components such as cabinetry, home appliances and accessories complement each other in terms of kitchen flow.

The influence of technological improvements in terms of cabinetry could be energy efficiency, time efficiency, easier and rapid application possibilities as well as aesthetical developments.

The demand for kitchen appliances is increasing as fast as the growth of globalization. Meanwhile, the main focus of the appliance market along with technology development is to provide the user with the most desirable and effective performance in addition to reducing the unnecessary number of actions and increasing time and labor costs. This would satisfy the first aim of appliance industry, which provides satisfaction and customization for users.

At the same time technology has its particular effects on developing kitchen accessories in terms of providing such gadgets that can apply efficiency, accessibility, visibility and improve space organization especially in small kitchens.

Although these influences have different profound effects on production results and their particular achievements, the general aim of these productions have remained the same.

For the purpose of this study, 141 kitchen related companies including cabinetry, appliances and accessory manufacturers that have attended the Milan Fair of 2011 are scanned through their websites. These companies are located in different countries all over the world, providing a variety of products that range according to different aspects of kitchen design. Therefore, each company's website has been investigated individually and the selected companies are classified according to three different production categories:

- Cabinetry
- Home Appliances
- Accessories

In relation to each category, three companies from most frequently appearing four countries were randomly selected.

In order to be able to produce an evaluation in more detail, all keywords that retrieved during the research and later on appear in the websites of different kitchen companies that are related to the four selected countries are determined.

Each company has not only been evaluated through various keywords, but has been classified according to the groups of keywords as well, in order to obtain the frequency of the group of keywords to have a more reliable result.

These evaluations provide the chance to achieve the most concerning issues in relation to kitchen components such as: Technology, Efficiency, and etc. The evaluation and comparison of keywords and their frequency in each category demonstrates the following result:

In cabinetry evaluation, the most frequent keywords were technology and efficiency and the least was durability and sustainability.

In home appliance evaluation the most frequent keywords were technology and efficiency and the least was style & aesthetics and sustainability.

In accessory evaluation the most frequent keywords were technology and the least was sustainability.

As it's mentioned above and shown in the tables 12, 13 and 14 the most frequent keywords in one category could be the least one in another category. However such keywords as Technology and innovation are in the first order.

This would not demonstrate that these companies are ignoring the least frequent keywords. However it could imply this fact that today, the companies are focusing more on implication of technology and innovation into the their kitchen components, in addition to insisting on mentioning it through their websites to introduce the quality and development of their production along with technology and innovation in order to attract and satisfy the needs of users.

Of course considering other aspects such as aesthetics and comfort has not been ignored. Meanwhile sustainability may have the least of focus in compare to technology. Therefore today, each category is focused on different issues which may be the most up to date aspect, which consumer may look for and kitchen industry attempts to provide it in order to increase the comfort and satisfaction of the clients.

Last but not least, each keyword is an essential element in the process of kitchen design. Considering such aspects at the same time, in relation to each other could be an aid to the development of kitchen in order to create a better life for user.

However being user friendly should not be a topic in a more important position than issue of being environment friendly. They require to be considered along with each other. Therefore this research could be continued by investigating the influences defining the advantages and disadvantages of technology on development of kitchen component in terms of environmental issues.

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APPENDICES

Appendix B: Evaluation of selected companies in terms of keywords

Cabinetry		Germany
Country:		ALNO AG
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		—
*Contemporary		—
*Quality		x
*Sustainability		x
*Creativity		x
*Longevity		x
*Innovation		x
*Comfort		x
*Efficiency		x
*Functionality		x
*Resistance		x
*Beauty		x
*Modern design		x
*Safety		x
*Strength		x
*Reliability		x
*Minimal design		x
*Flexibility (Modularity)		x
http://www.alno.de/		18/20

Cabinetry		Germany
Country:		Pronorm
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		x
*Contemporary		x
*Quality		x
*Sustainability		x
*Creativity		x
*Longevity		x
*Innovation		—
*Comfort		—
*Efficiency		x
*Functionality		x
*Resistance		x
*Beauty		x
*Modern design		x
*Safety		x
*Strength		—
*Reliability		x
*Minimal design		—
*Flexibility (Modularity)		x
http://www.pronorm.de/		16/20

Cabinetry		Germany
Country:		Poggenpohl international
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		x
*Contemporary		x
*Quality		x
*Sustainability		x
*Creativity		x
*Longevity		x
*Innovation		x
*Comfort		x
*Efficiency		—
*Functionality		x
*Resistance		x
*Beauty		x
*Modern design		x
*Safety		—
*Strength		x
*Reliability		—
*Minimal design		—
*Flexibility (Modularity)		—
http://www.poggenpohl.de		15/20

Cabinetry		Italy
Country:		Ardinea
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		—
*Contemporary		—
*Quality		x
*Sustainability		x
*Creativity		x
*Longevity		x
*Innovation		x
*Comfort		x
*Efficiency		x
*Functionality		x
*Resistance		x
*Beauty		—
*Modern design		—
*Safety		x
*Strength		x
*Reliability		x
*Minimal design		—
*Flexibility (Modularity)		—
http://www.arclinea.it		14/20

Cabinetry		Italy
Country:		Boffi
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		x
*Contemporary		x
*Quality		—
*Sustainability		x
*Creativity		x
*Longevity		—
*Innovation		x
*Comfort		x
*Efficiency		—
*Functionality		—
*Resistance		—
*Beauty		—
*Modern design		—
*Safety		—
*Strength		—
*Reliability		—
*Minimal design		—
*Flexibility (Modularity)		x
http://www.boffi.com/		9/20

Cabinetry		Italy
Country:		Arredamenti Morgana
Company:		
(Keywords):		
*Well designed		x
*Technology (Smart Design)		x
*Classical		x
*Contemporary		x
*Quality		x
*Sustainability		—
*Creativity		—
*Longevity		x
*Innovation		x
*Comfort		x
*Efficiency		—
*Functionality		—
*Resistance		—
*Beauty		x
*Modern design		x
*Safety		—
*Strength		—
*Reliability		—
*Minimal design		x
*Flexibility (Modularity)		—
http://www.arredamenti.organa.com/		11/20

Cabinetry		USA
Country:		USA
Company:		Elkay
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		—
•Contemporary		—
•Quality		x
•Sustainability		—
•Creativity		—
•Longevity		—
•Innovation		x
•Comfort		—
•Efficiency		—
•Functionality		x
•Resistance		—
•Beauty		x
•Modern design		—
•Safety		—
•Strength		x
•Reliability		—
•Minimal design		—
•Flexibility (Modularity)		—
http://www.elkay.com/		7 / 20

Cabinetry		USA
Country:		USA
Company:		Merillat
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		x
•Contemporary		x
•Quality		x
•Sustainability		—
•Creativity		—
•Longevity		—
•Innovation		—
•Comfort		—
•Efficiency		x
•Functionality		x
•Resistance		x
•Beauty		x
•Modern design		—
•Safety		x
•Strength		x
•Reliability		—
•Minimal design		—
•Flexibility (Modularity)		—
http://www.merillat.com/		11 / 20

Cabinetry		USA
Country:		USA
Company:		Poliform
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		x
•Contemporary		x
•Quality		x
•Sustainability		x
•Creativity		x
•Longevity		—
•Innovation		x
•Comfort		—
•Efficiency		x
•Functionality		x
•Resistance		x
•Beauty		x
•Modern design		—
•Safety		—
•Strength		—
•Reliability		x
•Minimal design		—
•Flexibility (Modularity)		x
http://www.poliform.it/		14 / 20

Cabinetry		UK
Country:		Gower
Company:		
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		—
•Contemporary		x
•Quality		—
•Sustainability		x
•Creativity		x
•Longevity		—
•Innovation		—
•Comfort		x
•Efficiency		x
•Functionality		—
•Resistance		—
•Beauty		—
•Modern design		—
•Safety		—
•Strength		—
•Reliability		—
•Minimal design		x
•Flexibility (Modularity)		—
http://www.gower-furniture.co.uk/		8/20

Cabinetry		UK
Country:		Magnet
Company:		
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		x
•Contemporary		x
•Quality		x
•Sustainability		x
•Creativity		x
•Longevity		—
•Innovation		x
•Comfort		x
•Efficiency		x
•Functionality		—
•Resistance		—
•Beauty		—
•Modern design		—
•Safety		—
•Strength		—
•Reliability		—
•Minimal design		—
•Flexibility (Modularity)		x
http://www.magnet.co.uk/		11/20

Cabinetry		UK
Country:		KraftMaid
Company:		
(Keywords):		
•Well designed		x
•Technology(Smart Design)		x
•Classical		x
•Contemporary		x
•Quality		x
•Sustainability		x
•Creativity		x
•Longevity		x
•Innovation		x
•Comfort		x
•Efficiency		x
•Functionality		x
•Resistance		x
•Beauty		x
•Modern design		x
•Safety		x
•Strength		—
•Reliability		x
•Minimal design		x
•Flexibility (Modularity)		x
http://www.kraftmaid.com/		19/20

Home Appliances		Germany	19/20
Country:		Bosch Appliances	
Company:			
(Keywords):			
•Technology		x	
•Innovation		x	
•Well designed		x	
•Quality		x	
•Longevity		x	
•Efficiency		x	
•Functionality		x	
•Sustainability		x	
•Comfort		x	
•Modern design		x	
•Beauty		x	
•Safety		x	
•Strength		x	
•Creativity		x	
•Resistance		x	
•Contemporary		x	
•Reliability		x	
•Classical		x	
•Flexibility		x	
•Minimal design		—	
http://www.bosch-home.com			19/20

Home Appliances		Germany	16/20
Country:		AEG	
Company:			
(Keywords):			
•Technology		x	
•Innovation		x	
•Well designed		x	
•Quality		x	
•Longevity		x	
•Efficiency		x	
•Functionality		x	
•Sustainability		x	
•Comfort		x	
•Modern design		x	
•Beauty		x	
•Safety		x	
•Strength		x	
•Creativity		x	
•Resistance		x	
•Contemporary		—	
•Reliability		x	
•Classical		—	
•Flexibility		—	
•Minimal design		—	
http://www.aeg.de/			16/20

Home Appliances		Germany	19/20
Country:		Gaggenau	
Company:			
(Keywords):			
•Technology		x	
•Innovation		x	
•Well designed		x	
•Quality		x	
•Longevity		x	
•Efficiency		x	
•Functionality		x	
•Sustainability		x	
•Comfort		x	
•Modern design		x	
•Beauty		x	
•Safety		x	
•Strength		x	
•Creativity		x	
•Resistance		x	
•Contemporary		x	
•Reliability		x	
•Classical		—	
•Flexibility		x	
•Minimal design		x	
http://www.gaggenau.com			19/20

Home Appliances		Italy
Country:		Arca Cucine
Company:		
(Keywords) :		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		x
•Efficiency		x
•Functionality		x
•Sustainability		x
•Comfort		x
•Modern design		x
•Beauty		x
•Safety		—
•Strength		x
•Creativity		—
•Resistance		x
•Contemporary		x
•Reliability		—
•Classical		x
•Flexibility		—
•Minimal design		—
http://www.arcacucine.it/		15/20

Home Appliances		Italy
Country:		Composit
Company:		
(Keywords) :		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		x
•Efficiency		x
•Functionality		x
•Sustainability		x
•Comfort		—
•Modern design		x
•Beauty		x
•Safety		—
•Strength		—
•Creativity		—
•Resistance		—
•Contemporary		x
•Reliability		x
•Classical		x
•Flexibility		—
•Minimal design		—
http://www.composit.it/		13/20

Home Appliances		Italy
Country:		ilve
Company:		
(Keywords) :		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		—
•Efficiency		—
•Functionality		x
•Sustainability		—
•Comfort		—
•Modern design		—
•Beauty		x
•Safety		x
•Strength		x
•Creativity		—
•Resistance		—
•Contemporary		—
•Reliability		—
•Classical		—
•Flexibility		—
•Minimal design		—
http://www.ilve.it		8/20

Home Appliances		USA
Country:		Whirlpool
Company:		
(Keywords):		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		x
•Efficiency		x
•Functionality		x
•Sustainability		—
•Comfort		x
•Modern design		x
•Beauty		—
•Safety		x
•Strength		x
•Creativity		—
•Resistance		—
•Contemporary		x
•Reliability		—
•Classical		—
•Flexibility		x
•Minimal design		—
http://www.whirlpool.com/		13/20

Home Appliances		USA
Country:		Miele
Company:		
(Keywords):		
•Technology		x
•Innovation		x
•Well designed		—
•Quality		x
•Longevity		x
•Efficiency		—
•Functionality		x
•Sustainability		x
•Comfort		x
•Modern design		—
•Beauty		—
•Safety		—
•Strength		—
•Creativity		—
•Resistance		—
•Contemporary		—
•Reliability		—
•Classical		—
•Flexibility		—
•Minimal design		—
http://www.miele.com		7/20

Home Appliances		USA
Country:		SHarp
Company:		
(Keywords):		
•Technology		x
•Innovation		x
•Well designed		—
•Quality		x
•Longevity		x
•Efficiency		—
•Functionality		x
•Sustainability		x
•Comfort		x
•Modern design		—
•Beauty		—
•Safety		—
•Strength		—
•Creativity		—
•Resistance		—
•Contemporary		—
•Reliability		—
•Classical		—
•Flexibility		—
•Minimal design		—
http://www.sharpusa.com/		7/20

Home Appliances		UK
Country:		Magnet
Company:		
(Keywords):		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		—
•Efficiency		x
•Functionality		—
•Sustainability		x
•Comfort		x
•Modern design		x
•Beauty		—
•Safety		—
•Strength		—
•Creativity		x
•Resistance		—
•Contemporary		x
•Reliability		—
•Classical		x
•Flexibility		x
•Minimal design		—
http://www.magnet.co.uk/		12/20

Home Appliances		UK
Country:		Neff
Company:		
(Keywords):		
•Technology		x
•Innovation		—
•Well designed		x
•Quality		x
•Longevity		x
•Efficiency		x
•Functionality		x
•Sustainability		x
•Comfort		—
•Modern design		—
•Beauty		x
•Safety		x
•Strength		—
•Creativity		x
•Resistance		x
•Contemporary		—
•Reliability		—
•Classical		—
•Flexibility		—
•Minimal design		—
http://www.neff.co.uk/		11/20

Home Appliances		UK
Country:		Kraftmaid
Company:		
(Keywords):		
•Technology		x
•Innovation		x
•Well designed		x
•Quality		x
•Longevity		x
•Efficiency		x
•Functionality		x
•Sustainability		x
•Comfort		x
•Modern design		x
•Beauty		x
•Safety		x
•Strength		—
•Creativity		x
•Resistance		x
•Contemporary		x
•Reliability		x
•Classical		x
•Flexibility		x
•Minimal design		x
http://www.kraftmaid.com/		19/20

Accessories		Germany	19/20
Country:		AINO AG	
Company:			
(Keywords):			
•Well designed		x	
•Technology		x	
•Quality		x	
•Innovation		x	
•Classical		—	
•Beauty		x	
•Contemporary		—	
•Sustainability		x	
•Modern design		x	
•Longevity		x	
•Functionality		x	
•Resistance		x	
•Strength		x	
•Reliability		x	
•Efficiency		x	
•Minimal design		x	
•Comfort		x	
•Flexibility		x	
•Safety		x	
•Creativity		x	
http://www.aino.de/			19/20

Accessories		Germany	16/20
Country:		Pronorm	
Company:			
(Keywords):			
•Well designed		x	
•Technology		x	
•Quality		x	
•Innovation		—	
•Classical		x	
•Beauty		x	
•Contemporary		x	
•Sustainability		x	
•Modern design		x	
•Longevity		x	
•Functionality		x	
•Resistance		x	
•Strength		—	
•Reliability		x	
•Efficiency		x	
•Minimal design		—	
•Comfort		—	
•Flexibility		x	
•Safety		x	
•Creativity		x	
http://www.pronorm.de/			16/20

Accessories		Germany	12/20
Country:		Grohe	
Company:			
(Keywords):			
•Well designed		x	
•Technology		x	
•Quality		x	
•Innovation		x	
•Classical		—	
•Beauty		x	
•Contemporary		—	
•Sustainability		x	
•Modern design		x	
•Longevity		x	
•Functionality		x	
•Resistance		x	
•Strength		x	
•Reliability		x	
•Efficiency		—	
•Minimal design		—	
•Comfort		—	
•Flexibility		—	
•Safety		—	
•Creativity		—	
http://www.grohe.com/			12/20

Accessories		Italy
Country:	Arredamenti Morgana	
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		x
*Contemporary		x
*Sustainability		—
*Modern design		x
*Longevity		x
*Functionality		—
*Resistance		—
*Strength		—
*Reliability		—
*Efficiency		—
Minimal design		x
*Comfort		x
*Flexibility		—
*Safety		—
*Creativity		—
http://www.arredamentiorgana.com/		11/20

Accessories		Italy
Country:	Alpes Inox	
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		—
*Classical		—
*Beauty		—
*Contemporary		—
*Sustainability		x
*Modern design		—
*Longevity		x
*Functionality		x
*Resistance		x
*Strength		x
*Reliability		x
*Efficiency		—
Minimal design		—
*Comfort		—
*Flexibility		—
*Safety		x
*Creativity		—
http://www.alpesinox.com		10/20

Accessories		Italy
Country:	Snaidero	
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		x
*Contemporary		x
*Sustainability		x
*Modern design		x
*Longevity		—
*Functionality		—
*Resistance		—
*Strength		—
*Reliability		—
*Efficiency		x
Minimal design		x
*Comfort		—
*Flexibility		x
*Safety		—
*Creativity		—
http://www.snaidero.it/		12/20

Accessories		USA
Country:		Bates & Bates
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		x
*Contemporary		x
*Sustainability		—
*Modern design		—
*Longevity		—
*Functionality		—
*Resistance		x
*Strength		—
*Reliability		—
*Efficiency		—
Minimal design		—
*Comfort		—
*Flexibility		—
*Safety		—
*Creativity		—
http://www.batesandbates.com		8/20

Accessories		USA
Country:		Blanco America
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		—
*Contemporary		x
*Sustainability		x
*Modern design		x
*Longevity		—
*Functionality		x
*Resistance		—
*Strength		x
*Reliability		—
*Efficiency		—
Minimal design		—
*Comfort		—
*Flexibility		—
*Safety		—
*Creativity		—
http://www.blancoamerica.com		10/20

Accessories		USA
Country:		Elkay
Company:		
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		—
*Beauty		x
*Contemporary		—
*Sustainability		—
*Modern design		—
*Longevity		—
*Functionality		x
*Resistance		—
*Strength		x
*Reliability		—
*Efficiency		—
Minimal design		—
*Comfort		—
*Flexibility		—
*Safety		—
*Creativity		—
http://www.elkay.com		7/20

Accessories		UK
Country:	Company:	Gower
(Keywords):		
*Well designed		x
*Technology		x
*Quality		—
*Innovation		x
*Classical		x
*Beauty		—
*Contemporary		x
*Sustainability		x
*Modern design		x
*Longevity		—
*Functionality		—
*Resistance		—
*Strength		—
*Reliability		—
*Efficiency		x
*Minimal design		—
*Comfort		x
*Flexibility		—
*Safety		—
*Creativity		x
http://www.gower-furniture.co.uk/		10/20

Accessories		UK
Country:	Company:	Kraftmaid
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		x
*Contemporary		x
*Sustainability		x
*Modern design		x
*Longevity		x
*Functionality		x
*Resistance		x
*Strength		x
*Reliability		—
*Efficiency		x
*Minimal design		x
*Comfort		x
*Flexibility		x
*Safety		x
*Creativity		x
http://www.kraftmaid.com		19/20

Accessories		UK
Country:	Company:	Magnet
(Keywords):		
*Well designed		x
*Technology		x
*Quality		x
*Innovation		x
*Classical		x
*Beauty		—
*Contemporary		x
*Sustainability		x
*Modern design		—
*Longevity		—
*Functionality		—
*Resistance		x
*Strength		—
*Reliability		—
*Efficiency		x
*Minimal design		—
*Comfort		x
*Flexibility		x
*Safety		—
*Creativity		x
http://www.magnet.co.uk/		12/20

Appendix C: Cabinetry Company With The Highest Ratio of Occuring

Keywords: Karftmaid

KRAFTMAID PRESS ROOM

PRESS ROOM HOME ▶

MEDIA RELEASES

- Accessories
- Architect and Designer Tools
- Bath
- Cabinetry
- Cabinetry Selection Process
- Company News
- Countertops
- Finish Samples
- Kitchen
- Literature
- Selection Guide
- 2010 Archive

IMAGE GALLERY ▶

VIDEO GALLERY ▶

FEATURE STORIES ▶

KRAFTMAID® +
DENOVA™
COUNTERTOPS

PRESS KITS ▶

KRAFTMAID®, MERILLAT®, QUALITYCABINETS™ AND DENOVA™ LEADING ARCHITECTURAL TECHNOLOGY CHARGE

Industry's First Optimized Cabinet and Countertop Models for Product Connect™ for Google SketchUp™



May 12, 2011 | For Immediate Release

ANN ARBOR, Mich. — Masco Cabinetry, home of the Kraftmaid®, Merillat®, QualityCabinets™ and DeNova™ countertop brands, is helping lead the newest digital design revolution by utilizing Igloo Studios' Product Connect™ for Google SketchUp™. The cabinet manufacturer, along with sister brands Delta® and Brizo®, now offers a varied portfolio of optimized cabinet, countertop and faucet models for the recently-announced Product Connect plugin.

"We're helping the A&D community bridge the gap between the specification and design process," said Mark Johnson, FAIA, CKD, AIBD, director of architect relations and education at Masco Cabinetry. "The addition of Product Connect to Google SketchUp takes digital designing one step farther. More than being able to share a rendering with clients, this new technology will help architects make product specification easier."

Product Connect, developed by Google partner Igloo Studios, was recently unveiled at the 2011 Kitchen & Bath Industry Show in Las Vegas, April 26-28. The free plugin reinvents the way architects specify products, saving time by generating organized product schedules and simplifying the process.

"The new Product Connect plugin for Google SketchUp provides designers with a more efficient method for selecting and specifying real-world, building products," said Mike Tadros, president of Igloo Studios, Inc. "The plugin, along with thousands of Product Connect compatible models available via the Google 3D Warehouse, is the culmination of years of work and intensive collaboration with product manufacturers, such as Masco Cabinetry."

Tadros added, "We've been extremely fortunate to work with clients who share our vision for providing designers with the technology, tools and resources they need in order to be successful, and we are very much looking forward to continuing on that path."

Typically, the rooms that we spend the majority of our time in—kitchens and baths—are the ones that present the most challenges. But they don't have to anymore. The Passport Series features kitchen and bath cabinets designed for individuals of all ages and abilities. KraftMaid understands that a barrier-free life is easier, more convenient and more enjoyable. Consider these ideas:

Kitchens

- Remove threshold areas to allow barrier-free entry and exiting from the room.
- Allow a five-foot radius of clear turning space throughout the room.
- Raise dishwashers to make them easier to load and unload.
- Install mounted ovens and microwaves at the preferred height for individuals and adjust the height of countertop surfaces to allow tasks to be performed more comfortably.
- Smooth surfaces for countertops and cooktops make it easier to move items and clean up.
- Bright task lighting helps with food preparation, while in-cabinet lighting banishes dark corners and makes labels easier to read.
- Single lever faucets and pulls rather than knobs on cabinets and drawers are easier to grip.
- Non-skid flooring provides a safe environment for young and old.

In kind, the Passport Series is certified for Universal Design by the Institute for In **Technology** Development. This cabinetry bears the "User Tested" seal, having undergone extensive testing by individuals with varying physical abilities.

KraftMaid's Passport Series offers style and functionality. The wide variety of finishes, door styles and decorative enhancements let you showcase your personal style, while the thoughtfully-engineered cabinetry provides flexibility to create the environment that best suits your needs.

With the Passport Series, you can create an atmosphere that is beautiful, safe and easy for anyone to work in!

Baths

- Remove threshold areas to allow barrier-free entry and exiting from the room.
- Allow a five-foot radius of clear turning space throughout the room.
- Installing grab-bars in strategic places helps navigation through a space and assists when standing or leaning to open hard-to-reach items.
- Non-skid flooring provides a safe environment for young and old.

Dining Room Hutches

A combination of stacked wall cabinetry and furniture drawers create this traditional dining room hutch. Timeless camed glass inserts with interior lighting illuminate everyday dishware. Accents like the Timeless ornament and cove feet add a **classical** touch.





Slab - Veneer (AB40) Quartersawn Oak in Onyx

Room Details:

Bryant Oak Square Quartersawn Oak in Onyx is the anchor in this dynamic, contemporary kitchen, echoed by the bold horizontal drawer pulls and open shelves. Angular chairs, stainless appliances, and punches of color complete the look.

Design Style:

Contemporary & Dynamic

The motto for the Contemporary & Dynamic style is "less is more."

[Learn More](#)

[See More Rooms in This Style](#)



IMAGINE
the Possibilities

LEARN
About Cabinetry

SELECT
My Products

PLAN
My Project

NEW TRENDS



KRAFTMAID PRESS ROOM

[PRESS ROOM HOME](#)

[MEDIA RELEASES](#)

[IMAGE GALLERY](#)

[VIDEO GALLERY](#)

FEATURE STORIES

- [Bath](#)
- [Cabinetry](#)
- [Cabinetry Selection Process](#)
- [Decorative Details](#)
- [Inspiration Guide](#)
- [2009 Archive](#)

[KRAFTMAID® +
DENOVA™
COUNTERTOPS](#)

[PRESS KITS](#)

[ABOUT KRAFTMAID](#)

ASCO RETAIL CABINET GROUP, THE MANUFACTURER OF KRAFTMAID CABINETRY, SELECTED TO RECEIVE 2009 OHIO AWARD FOR OUTSTANDING ACHIEVEMENT IN ENVIRONMENTAL STEWARDSHIP



December 10, 2009 | For Immediate Release

(MIDDLEFIELD, OHIO) First Lady Frances Strickland and Chris Korfeski, director of the Ohio EPA, today presented the Ohio Award for Outstanding Achievement in Environmental Stewardship to six organizations including Masco Retail Cabinet Group, the manufacturer of KraftMaid Cabinetry.

Receiving the award for KraftMaid Cabinetry was Chris Winans, Vice President of Operations at Masco Retail Cabinet Group. "We're honored and grateful to be recognized for our efforts in environmental responsibility and sustainability," he said.

"From our start as a small cabinetry shop and through every aspect of our business, taking personal responsibility for the environment is central to our culture. This award validates our sustainable practices to our customers and neighbors."

All KraftMaid Cabinetry plants operate under an environmental management system certified to ISO-14001:2004. The company also:

has earned certification under the Environmental Stewardship Program (ESP) administered by the Kitchen Cabinet

SELECT MY PRODUCTS

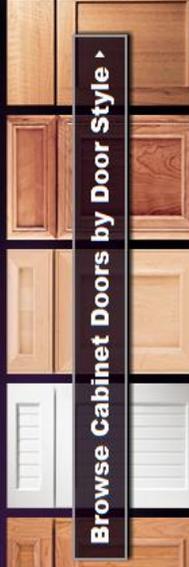
Personal expression and life's experiences are driving interior home design, now more than ever. It is a great combination of contemporary and traditional trends where **creativity**, and personal style have no bounds. At KraftMaid, we hope you learn a little about us but also a little about yourself while exploring our styles with your imagination. **KraftMaid®. It becomes you™.**



[Browse Cabinet Doors by Design Style](#) ▶



[Browse Cabinet Doors by Finish](#) ▶



[Browse Cabinet Doors by Door Style](#) ▶

PRODUCTS

WHISPER TOUCH

NEW CABINET DOORS

NEW DECORATIVE ENHANCEMENTS

NEW FINISHES

NEW STORAGE SOLUTIONS

NEW DECORATIVE ACCENT COLLECTIONS

ACCESSORIES



Whether enamored with the ornate formality of Heritage or the casual comfort of Coastal, customers are looking for cabinetry that provides **longevity** in their homes. KraftMaid is introducing 32 new finishes with undeniable staying power. The beautiful palette of colors focuses on classic choices that provide a multitude of new design opportunities along with the confidence that these finishes will remain in style.

Finish Color 

Finish Technique 

Wood Type 

131 Results



Square Raised Panel - Solid (MTM) Maple in Biscotti w/Cocoa Glaze



Classic Camed Insert



Venetian Bronze Pull



Room Details:

Elegance meets **functionality** with base pull-out drawers and hidden pantries, an island with extra storage and a matching hutch for linens and wine. Elegance meets **functionality** with base pull-out drawers and hidden

Design Style:

Classically Traditional

If these walls could talk, they would





Next steps ▶

See all steps

IT BECOMES TOUGH. VERY, VERY TOUGH.

KraftMaid employed a recognized finish testing laboratory to test the Durakraft finish for **resistance** to common household chemicals and agents. Three cc's of each agent were applied to the Durakraft finish test door and covered for a period of 24 hours. The result? Durakraft exceeds all specifications required by the Kitchen Cabinet Manufacturers Association (ANSI/KCMA A161.1-1995).

In addition to chemical testing, Durakraft was also tested for **resistance** to extreme temperatures and was found to withstand temperatures below -5°F and above 120°F.

TEST RATINGS AND DEFINITIONS

UNAFFECTED

No color or surface texture change.

- Gasoline, Water, Fingernail polish remover, Acetone, Moth spray, Fly spray, Household soaps, Soapless detergent, Olive oil, Coffee, Citric acid solution (10%), Mustard, Maxcraion, Urea



We're sorry, there are no results for your search.

Showing 1-1 of 1 results

GLOSSARY - KRAFTMAID CABINETS

"an area to reflect an individual style. CLASSIC GLASS Classic glass features **minimal** patterns and texture, with or without bevels, so you can display your serving ware..."

<http://www.kraftmaid.com/support/glossary/>

Showing 1-1 of 1 results

IMAGINE

- the Possibilities
- Photo Gallery
- Explore Your Style
- KraftMaid by Design Blog
- Ask a Designer

LEARN

- About Cabinetry
- Why Choose KraftMaid
- Quality of Construction
- Patented Durakrafit Finishing Process
- What's New
- Choosing the Right Cabinetry
- Universal Design

SELECT

- My Products
- Cabinet Doors
- Glass Doors
- Moldings and Accents
- Lighting
- KraftMaid Storage Solutions
- Bath Collections

PLAN

- My Project
- Kitchen Planning
- Bath Planning
- Throughout the Home

NEW PRODUCTS

New Bath Accent Collections

Create a fully coordinated look throughout your bath with our new uniquely designed accent collections.



SUPPORT

- View Order Status
- Caring For Your Cabinetry
- FAQs
- Sample Ordering
- Warranty
- Glossary
- Cabinet Specs.
- Contact Us

COMPANY

- Environmental Commitment
- Manufacturing Process
- Careers
- Press Room

Whisper Touch™

Silence is standard. Now doors and drawers close softly and quietly every time, thanks to the Whisper Touch Hinge and Whisper Touch Drawer Runner.



Appendix D: Home Appliance Company With The Highest Ratio of Occuring Keywords:

Bosh Appliances

Home Appliances

Home > Products > Store > Customer Service > Dealer Locator > Experience Bosch > Press

My Account My Basket (0)

Environmental pledge

Bosch appliances use less energy

Look for this symbol to help you identify our most energy efficient models.

Green Technology inside

The right environmental choice

Backed by groundbreaking technological innovations, Bosch develop some of the world's most economical and efficient home appliances.

Energy efficient appliances

See a range of energy efficient appliances from washing machines to fridge freezers

> Discover

Technologies that not only improve our daily life, but our future too.

Bosch is constantly guided by this principle, from environmentally-friendly production methods to researching new, energy-efficient technologies.

Our environmental pledge

We set ourselves very strict guidelines, and in the majority of cases these exceed statutory regulations. This environmentally friendly approach is adhered to throughout the entire design and manufacturing process. Wherever possible we use recyclable plastics, and label all plastics parts so they can be easily sorted and disposed of in an

Energy Savings Calculator

See how much you could save with a new Bosch freestanding appliance

> See what you could save

New energy labeling scheme

Learn about the new energy label scheme and what it means to you

> Explore

Home Appliances



- Home
- Products >
- Store >
- Customer Service >
- Dealer Locator
- Experience Bosch
- Press

Enter keyword or product

My Account My Basket (0)

Service you can depend on.

For help with your home appliance, trust our award winning Bosch Customer Service.



Reliability guaranteed. No compromises



Quality service straight from the original manufacturer: Bosch



Speedy response



Lifetime service goes without saying at Bosch



1 2 3

Our Products



Press Release Detail

BOSCH RETAINS TOP CUSTOMER SERVICE AWARD

Bosch Customer Service is proud to announce that it has retained the coveted Total Excellence and Quality (TEQ) service award for 2010.

In the annual independent survey of over 420,000 customers who had an engineer's visit in the last 12 months, an impressive 95.2% rated Bosch Customer Service as excellent or good in the 'white goods manufacturers' category. As a result, Bosch took first place once again in 2010, beating its own record score of 94.5% achieved when winning the award in 2009.

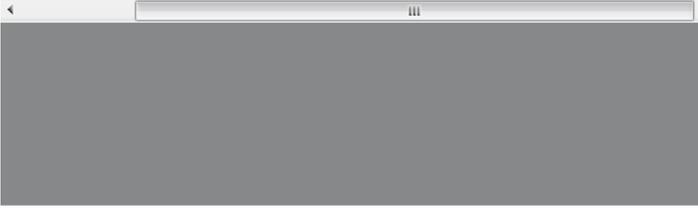
To retain the award for the second year in succession, Bosch Customer Service has worked hard to evaluate every aspect of the customer experience to further improve and enhance all procedures.

Specific developments since winning the TEQ award last year include reinforced training for contact centre staff, shorter lead times for engineer visits, more parts deliveries and a new internal mentoring scheme. In addition, online customer service has been expanded to include a 24-hour booking service for engineer visits.

"We work with staff to ensure that the customer comes first at every stage of the process, from the initial call to the engineer's visit" states UK Service Manager, Steve Clarke, adding: "In many ways, it is more pleasing to have won this award twice as it shows the sustainability and robustness of our customer service"

Release Date : 31/07/2010

 File(20 KB)



Invented for life

Home > Invented for life



Which? Best brand 2009
 Bosch Home Appliances awarded Best Brand 2009 for providing customers with value for money.



World's most economical

Nothing less than a revolutionary new dishwashing system that uses every single drop of water to the maximum, making these dishwashers the most efficient ever.



Designed to make life easier

Bosch dishwashers offer the ultimate in wash performance. A range of different programme options ensure the wash and rinse cycles are tailored to the load.



Multi-function cooking

Up to 11 different cooking functions from traditional heating systems to more specialised functions, means a Bosch oven will give you the flexibility to prepare a variety of meals for your family.



Energy efficient drying

Our EcoLogix 7 tumble dryer uses over 40% less energy than a standard A-rated dryer, and is the first dryer in the world to consume less than 2KWh for a standard programme.



Revolutionary storage

The Easy Access fridge uses a system of pull-out drawers instead of shelving, so you can access all items without moving other items or excessive bending down making this a truly innovative product.



Wash programmes

Perfectly tailored to suit modern fabrics and lifestyles, Bosch washing machines have a choice of 15 different clothes care programmes for you to choose from.

type or content

- Announcement (1)
- Article (0)
- Event (0)
- FAQ (0)
- News (0)
- Content (5)

<p>> Active Water Use every single drop of water to the maximum.</p> <p>> More</p>
<p>> FlexInduction hobs Ultimate flexibility with our new FlexInduction hobs</p> <p>> More</p>
<p>> Dishwasher capacity Dishwasher basket designs offer more flexibility, the unique VarioDrawer on the Logixx dishwasher replaces the standard cutlery baskets creating space for up to 14 place settings.</p> <p>> More</p>
<p>> Partner Products Bosch Home Appliances These Partner Products reduce water and energy use while maximising cleaning performance, featuring targeted water circulation and improved pump performance, as well as greater loading capacity and flexibility.</p> <p>> More</p>
<p>> Bosch Home Appliances Invented for life Up to 11 different cooking functions from traditional heating systems to more specialised functions, means a Bosch oven will give you the flexibility to prepare a variety of meals for your family.</p> <p>> More</p>
<p>> Multi-function Cooking Bosch Home Appliances Cooking functions. Multi-function cooking provides a solution for all your cooking requirements. With a choice of up to 11 different cooking functions, from traditional heating systems to more specialised functions such as Hydrobaking and Pizza setting, a Bosch oven will provide you with the flexibility to prepare a variety of meals for you and your family. 3D hot air cookingThe element around the fan distributes the heat quickly and evenly throughout the oven for same temperature cooking on three levels. Sweet and savoury items can be cooked at the same time. At higher temperatures (200-220°C) the effect is to evenly grill on three levels – with no ...</p>

Home Appliances



Enter keyword or product

My Account My Basket (0)

- Home
- Products
- Store
- Customer Service
- Dealer Locator
- Experience Bosch
- Press

Home > Ultimate flexibility with our new FlexInduction hobs

Ultimate flexibility with our new FlexInduction hobs



One, two, three pots or even a large casserole: the new FlexInduction hob leaves it up to you. At the flick of a switch, you can combine two induction zones into a large induction surface on which you can cook the way you want.

New FlexInduction hob

See FlexInduction hob details
> Explore

Hobs

See the hobs range
> Explore

Accessories online

Buy induction hob pan sets
> Buy accessories

FlexInduction

Our new FlexInduction hobs feature two standard circular cookzones and one rectangular FlexInduction zone covering the length of the hob, consisting of four 20 cm x 9 cm induction coils. This is great for multiple pans, large pans or for placing pans of varying sizes anywhere on the zone.



Small item detection

A zone must be 30% covered to activate, so it is less likely that a small item such as a knife or spoon will activate the hob, making it even safer. Conversely, the fact that each individual induction zone is smaller within the FlexInduction zone, smaller diameter pans will still be activated.



Even more energy efficient

Induction hobs are already more energy efficient than other hobs, but FlexInduction saves even more energy. Because it is



Connect/Disconnect mode

With FlexInduction you can control 2 pots separately on 'Disconnect' default mode. Alternatively, use the whole area on



**Appendix E: Accessory Company with The Highest Ratio of
Occuring Keywords: Alno Ag**

ALNO

THE TWINS OF MY DAUGHTER
ARE TRUE MISCHIEF MAKERS.
WHEN THEY SET THEIR MINDS
TO IT, THEY ARE NOWHERE TO
BE FOUND. I USUALLY CAN'T
FIND THEM VERY QUICKLY
EITHER SINCE MY KITCHEN HAS
SO MANY BIG CABINETS AND
PLACES TO HIDE.:



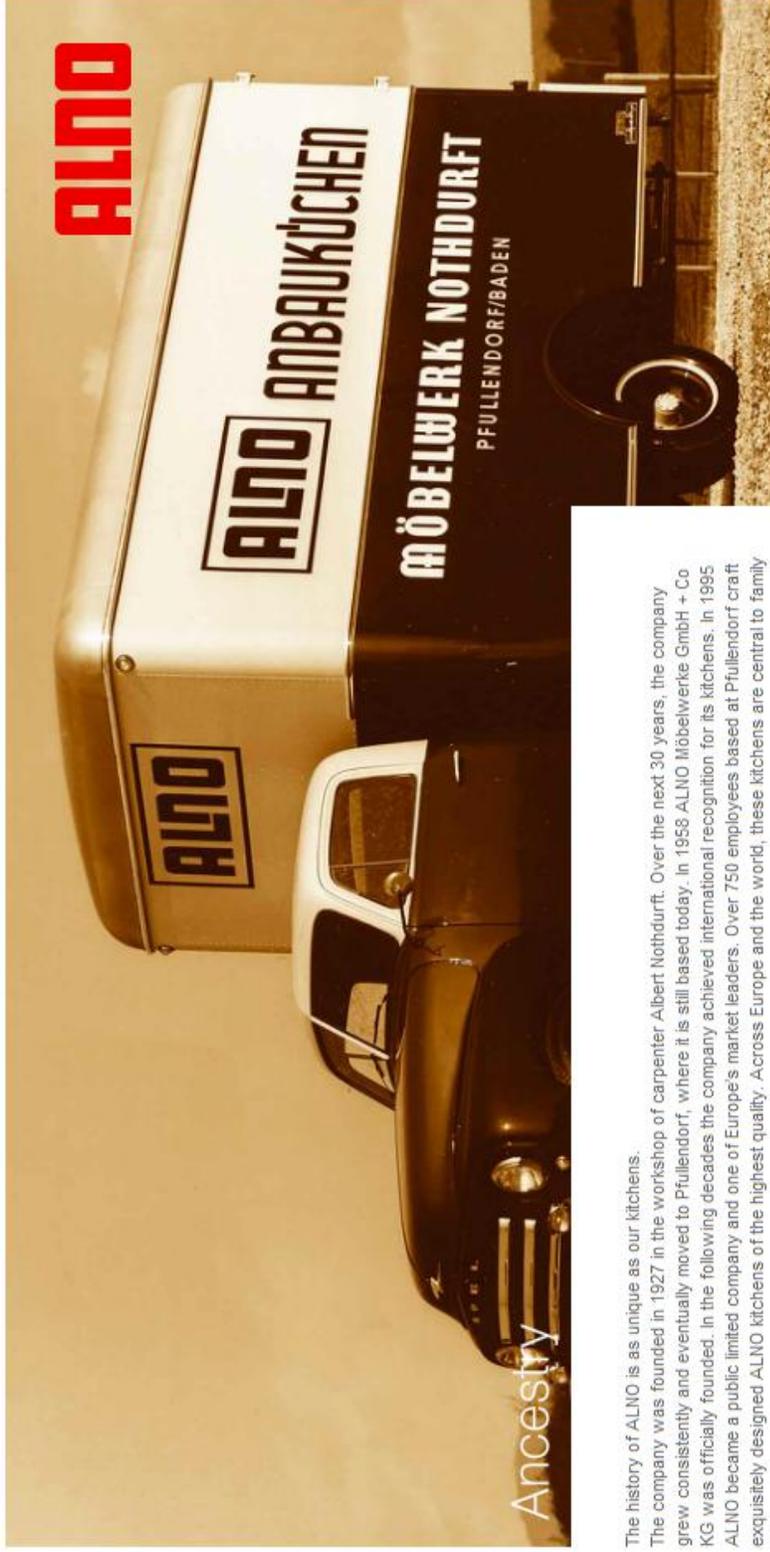
ALNO. GENERATION KITCHEN.



A good look is one thing. But ALNO kitchens are much more than that. Creative, functional fittings make efficient use of the available space and keep everything perfectly organised. Everything is where it should be, and is easily accessible, so that you have more space and time for yourself.

FITTINGS

- FITTINGS - UNIT SYSTEMS
- DRAWERS AND PULL OUTS
- VALUE ADDED FITTINGS
- GLASS AND METAL
- SPACE FOR TRUST
- NICHE SYSTEMS
- LIGHTING SYSTEMS
- SINK AND WASTE SEPARATION SYSTEM



The history of ALNO is as unique as our kitchens. The company was founded in 1927 in the workshop of carpenter Albert Nothdurft. Over the next 30 years, the company grew consistently and eventually moved to Pfullendorf, where it is still based today. In 1958 ALNO Möbelwerke GmbH + Co KG was officially founded. In the following decades the company achieved international recognition for its kitchens. In 1995 ALNO became a public limited company and one of Europe's market leaders. Over 750 employees based at Pfullendorf craft exquisitely designed ALNO kitchens of the highest quality. Across Europe and the world, these kitchens are central to family living.

ALNO

Good for the environment, good for people

ALNO suppliers have to certify that their materials and products do not present any health dangers and adhere to the German and international quality standards concerning healthy living.

These standards guarantee that ALNO kitchens and their components do not generate any harmful emissions. Coating, lacquering and galvanizing processes only use non-toxic substances without compromising on quality standards particularly in respect of non-fading and scratch/wear resistant finishes. The GS safety label confirms the reliability and longevity of the functional and mobile parts. All materials undergo extensive tests in our own laboratories and are continuously monitored under the DIN ISO 9001 quality management system.

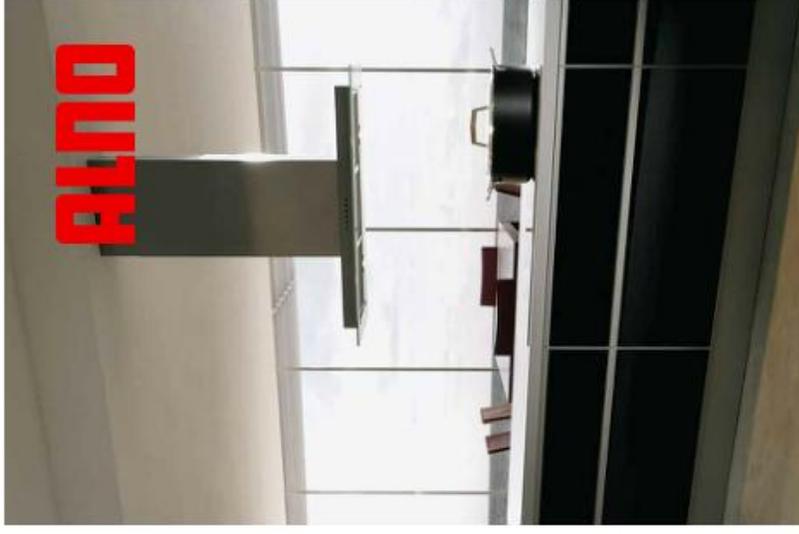
In addition to this, ALNO's environmental management system ensures that only environmentally conscious processes are used within the factory. The aim of this system is to achieve a resource-friendly production by identifying and implementing energy saving opportunities, such as encouraging a reduction in water consumption, as well as reducing the waste to an absolute minimum. Continuous training is given to all production employees to ensure responsible use of energy and other resources and in order to protect them from harmful conditions (e.g. how to reduce noise levels). A strict recycling policy is in operation at our production facilities and offices.

Listed are just a few examples of ALNO's environmental policies:



<p>Initiative LifeCare KitchenInnovation of the Year® 2012</p> <p>award-winning product</p> <ul style="list-style-type: none"> ✓ sustainability ✓ functionality ✓ product benefit <p style="text-align: right;">Consumers' Choice</p>	<p>Initiative LifeCare KitchenInnovation of the Year® 2012</p> <p>Best of the Best <small>Category: kitchen furniture and equipment</small></p> <ul style="list-style-type: none"> ✓ functionality ✓ sustainability ✓ product benefit <ul style="list-style-type: none"> ✓ design ✓ innovation <p style="text-align: right;">Consumers' Choice</p>
---	--





Experts and consumers agree: ALNOSTAR CERA wins the "Golden Award - Best of the Best" kitchen innovation 2012.

Once again, ALNO is awarded this distinction by the LifeCare Initiative, whose objective is to promote product quality, innovation and design and thus tangibly improve the quality of life. The **Kitchen innovation award** is a mark of quality for products which meet consumers' needs to a particularly large extent.

With its new high-end range, ALNO was able to convince the jury in respect of functionality, innovation, product benefits, design and sustainability.



ALNO AG Receives Further Award: The Best Marketing Company Award 2011

ALNO has been for the first time been recognised in the top ten in the category "large companies with 250 plus employees," taking 8th place. Unlike most other marketing awards, The Best Marketing Company Award - awarded by the consulting firm Batten + Company - is based not on a jury decision but on the scientific research of the Chair of Innovative Brand Management (LiM ®) at the University of Bremen.

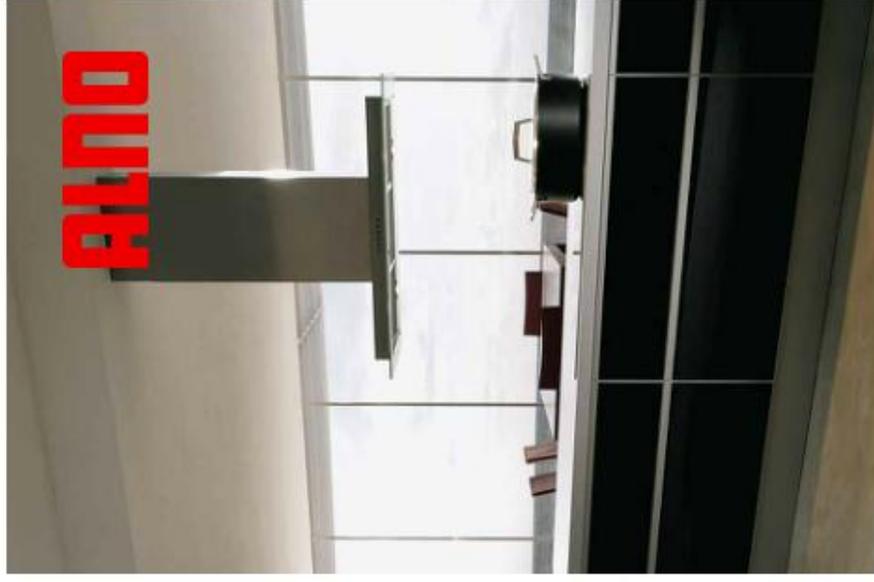
WIIICI



The ALNOMARECUCINA has been presented with the Interior Innovation Award 2011.

With its elegant form, this unique kitchen pays homage to the maritime way of life. High-quality materials, suave shapes and attractive details arouse associations with the nautical world attributing the ambience an exclusive aura. Natural walnut and glossy white paint, shiny chrome and mild light enthuse and appeal to all of the senses.

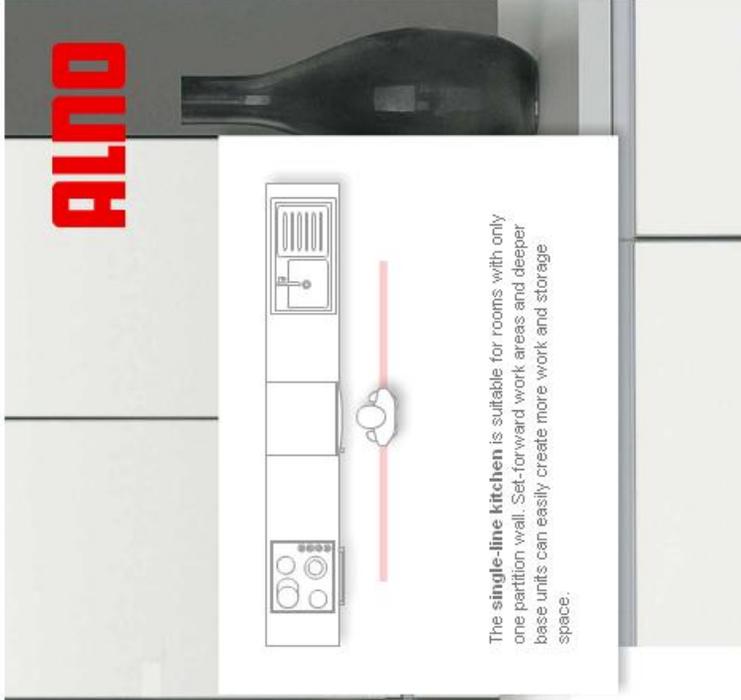
The Interior Innovation Award is one of the world's most prestigious design prizes in the interior design sector and was initiated by the imm cologne which also organises the competition.



With the ALNOSTAR SATINA glass kitchen a kitchen furniture concept was created that significantly contributes to a uniform appearance of kitchen appliances and furniture elements, in collaboration with Bosch Home Appliances and with Schott AG. Therefor get ALNO the RED DOT DESIGN AWARD 2010.



reddot design award
winner 2010



The **single-line kitchen** is suitable for rooms with only one partition wall. Set-forward work areas and deeper base units can easily create more work and storage space.

Modern kitchen design is all about using creative, individual and unusual design alternatives in order to create the most efficient use of space. There are various different kitchen shapes which, depending on the size and layout of the room, embrace the principles of the so-called work triangle as a practical arrangement of sink, fridge and oven and represent extremely sensible and practical solutions.



Everyone is different. To make your ALNO kitchen a relaxed and comfortable working environment, it should be designed precisely according to your personal requirements.

Getting the right working height is an important part of the design process. It must be adjusted to your body size. ALNO makes this possible with four different standard plinth heights and a variety of unit heights. Different heights within a run of units make ergonomic sense. The ALNO base units are based on a 13 cm modular system and are available in five module heights for the lowered cooking area and in six module heights for food preparation and washing up. The ideal niche height is 48 cm.

Is it important to you to have short work surfaces and therefore only short distances between work zones? If so, the best place for the dishwasher is next to the unit where you keep your crockery. Electrical appliances built in at a higher level make things easy on your back, and the storage space should be comfortable to use as well. Drawers and pull-outs in base units that can be pulled out fully provide easy access to the furthest corner of the units. Wall units with folding, lifting and flap doors mean that there is nothing in the way of your head even when they are open...

PLANNING | ERGONOMICS



In the add-on units with roller shutters in aluminium or stainless steel-look, all those things that you need frequent access to can be tilted away so that they are always easily accessible. Particularly suitable for smaller kitchens are wall units with sort-lift or folding doors. They have an attractive look when closed and ensure maximum headroom when open. They open and close effortlessly thanks to modern fittings and damping technology.

FITTINGS | GLASS AND METAL



ALNO



Kitchens are space for living. Especially for families. That's why ALNO kitchens don't just offer robust quality but also the utmost safety for the very youngest with sensible additional products. For instance cooker guards make sure that children's hands can't get too close to the hob. All glass doors and pull-outs are made of shatterproof safety glass. Ovens can be made safe by mounting them higher up and magnetic locks protect children from any potentially dangerous contents in cupboards such as cleaning agents, medicines, rubbish, ect.

FITTINGS | SPACE FOR TRUST