Aspects of the best Technological Crafts Design Practice

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Abstract

Skillful young designers, artisans-producers, and selling agents of their creations are triggering the revaluation and conversion of handcrafted work. It depicts a new relationship between design and craft, which is useful in an ambivalent way. The term "technological crafts design" refers to an experimental approach to new visions, in which the desire is manifested to reclaim possession of handcrafting as a tool of concept, of the production processes, of the ability to control the various stages of production and characterization of products which has become increasingly advanced. As crafts, techniques, and expressions change, attention must be paid to the relationship between technical knowledge and design, manual ability, and creative process. This new form of self-production is mainly carried out by young designers who made their mark in London in the 1990s, in Chelsea district, where the Art & Crafts council1 has sponsored many "crafts" projects, rewarding a group of young British designers with a strong desire for experimentation, probably originating from Anglo-Saxon German teaching method. Technological craft design is an experimental approach where the craft designer is free to experiment with new materials, techniques & processes, then rewarded with innovative creations that would improve the self-production trend.

Keywords

crafts, Design, technology, self-production

الملخص

يهدف المصممين الشباب، والحرفيين والمنتجين، إلى إنتاج أعمال إبداعية لوضع تصور جديد للعلاقة بين التصميم والحرفة، وهو ويفتح نوافذ للدراسة والنقاش. الحرف التكنولوجية تشير إلى نهج تجريبي يهدف لاستعادة مميزات الحرف كأداة للتصميم، وعمليات التصنيع، والقدرة على التحكم في مختلف مراحل الإنتاج وتوصيف المنتجات التي أصبحت متقدمة بشكل متزايد في الصناعة، حيث تتطور الحرف والتقنيات وطرق التعبير الشكلي والبصري، مع الانتباه إلى اتحاد المعرفة الفنية والتصميم والقدرة اليدوية والعملية الإبداعية. كانت بداية ال,تاج الذاتي على يد مجموعة من المصممين الشباب الذين بدأوا في إثبات وجودهم في التسعينيات في لندن، وتحديداً في منطقة تشيلسي، حيث قام Art & Crafts Council برعاية العديد من مشاريع "الحرف اليدوية"، بما يشجع بعض شركات المصممين البريطانيين الشباب المتأثرين بطرق التدريس الأنجلو سكسونية الألمانية. التصميم الحرفي التكنولوجي هو نهج تجريبي يتمتع فيه المصمم الحرفي بتجربة عمليات جديدة.. منتجاً إبداعات مبتكرة تحسن اتجاه الإنتاج الذاتي.

مشكلة البحث تعتبر التحولات الاقتصادية الداعية الى الاهتمام بريادة الأعمال سبباً في زيادة الحاجة إلى ممارسة الحرف اليدوية التكنولوجية التي من شأنها زيادة الإبداع في المنتجات الحرفية. للنجاح في ريادة الأعمال والإنتاج الذاتي يحتاج المصممون إلى امتلاك مهارات والإلمام ببعض الجوانب. يجيب البحث على التساؤل التالي:

ماهي الاعتبارات والجوانب الخاصة بممارسة أفضل تصميم حرفي تكنولوجي؟

هدف البحث الهدف من البحث هو مساعدة مصممي الحرف اليدوية التكنولوجية الشباب على أن يصبحوا أفضل في إنتاج منتجات الإنتاج الذاتي من خلال تسليط الضوء على الجوانب التي يمكن أن تساعدهم على تحقيق أهدافهم في الحرف المبتكرة.

Research Problem

Due to global economic shifts that call for self-production and entrepreneurialism, technological craft design is becoming a necessity. Innovation can be brought to life using Technological Craft Design. to succeed in the design and manufacturing of new self-producing products, designers must have skills in certain aspects. This research is trying to answer that question:

What are the Aspects of the best Technological Craft Design Practice?

Research aim:

The aim of the research is to assist young technological craft designers in becoming more successful at producing self-producing artefacts by highlighting the aspects that can help them achieve their innovation craft goals.

Keywords

crafts, design, technology, self- production.

Introduction

Crafts Design is a term known between people who practice the design of crafts but, this is not the whole story as crafts men may not be designers, similarly not all product designers practice crafts design, therefore, the two words may also be used separately. Tarkko Oksala (2022) noted that philosophers like John Dewey have noted that Aristotle's consanguinity with craft is not exclusive to his poetics. In Aristotle's metaphysic of "four reasons," Dewey believes that we can also find reflections on artisans (formal purpose), for whom and for what purpose? (final cause), how will the work be done? (efficient effect) and what should the product be made of? (material origin). When we answer those four questions, we will find ourselves translating them into the core of what design means. In order to reimagine the entire art form, leading to a dramatic transformation in our understanding of what is art, we must expect something totally innovative (Paul Valery, as cited in Benjamin, 1968). In the era of globalization, self-production is being increasingly appreciated by users who have begun to reassess small production series that have strong and characteristic forms (reaching a point where "ethnic" objects are preferred). It is obvious that thinking about products was no longer the same according to the way designers were thinking specially during the post-Fordist period where the age of capitalism, found its way in society. (Chris Pick Vanceet al.2003). Since the 1990s, entrepreneurialism became a reality in Europe through small production lines known as self- production. Ideas &/or designs that were being rejected before finding its rebirth in a slow but steady form reversing the consolidated structure, with different characteristics based on geographical, socioeconomic, and cultural contexts. This is best introduced by countries where Dutch design is presented under the local authority in Holland, where they focused on experimenting with materials &

techniques, making high quality products that have all the needed features to be sold in international markets. The research aims to highlight the issue of technological craft and introduce how designers are practicing it, explores the usage of the term experiment in literature and reflects on its appropriateness in the field of crafts design. This will be done by connecting technological craft to innovation and conducting three craft design experimental projects that include innovative practice where the act of making and doing are representing the concept of new experimentalism invented by Ian Hacking (1983) and the term "practitioner's reflection-in-action" coined by Donald A Schon (1983).

Technological handicrafts as innovation

Modern markets are thirsty for the innovative products based on the new experimentalism of crafts design, such products sound appealing to users who are no longer satisfied with the products provided by mass production companies (Kalviainen, 2000). Crafts have been considered a source of economic growth since 1998 (Schwarz & Yair, 2010). This means that crafts have the ability to participate in developing and defining the new economic model. The issue of importance of experimenting with making was highlighted for the first time by Francis Bacon. He argued that one must "twist the lion's tail", to discover its real characteristics watching from a distance won't give enough information. Ian Hacking discussed his opinions related to experiments by stressing on the importance of hands on exploring. (Hacking 1983) coined the term New Experimentalism "(Chalmers 2008). The technological craft approach rises from the New Experimentalism basics. Ian's work broadened the visualization of experimenting. Technological crafts seek connecting the role of crafts design practicing with scientific research as type of practice that leads to innovation. Technological craft based on the concept of new experimentalism and its consequences still needs more research (Koskinen, Binder & Redstrom 2008, Ku. Uksayra. Et al 2009; Hall 2011). Donald A. Schon's (1983), opinions have been highly appreciated by the design & crafts design communities. Schon looked into experimentalism, and his main concern was how professionals would come over issues facing them in their daily professional practices, and he came up with the concept of "practitioner's reflection-in-action", (ibid.:141). If a craft designer asks himself what makes a chair design light & stable? And tries to find an answer for this question by experimenting with materials, joints and design lines; he is practicing technological crafts." (ibid.:147). Such experiments of professional practices targets designing better artefacts. By placing new experimentalism as a core of technological craft we aim to understand and to find an innovative solution. Schon sees innovation as "The practitioner has an interest in transforming the situation from its current features to brand new better ones. Yang and Shafi (2020), define innovation as the "beginning of new & crucially developed products or techniques related to the production of handicrafts." Chand et al. (2014) claim that "innovation in handicraft industry refers to entrepreneurs' ability to offer novel artifacts in marketplace". Nowadays, not all users are looking for the decorative features of traditional crafts .Donkin (2001) argues that the nature of craft design is not fixed, and that it changes over time. As societies become industrialized, the design and function of crafts also change over time (Ela, 1988). To revive this industry, handicraft manufacturers must find new ways to do so. Innovation has often been considered a crucial component of a company's competitive advantage. (Schumpeter, 1934; Chand , 2014; Dunk, 2011) For the previously mentioned reasons, handicrafts designers, must be aware of the

latest technological advancements to maintain a competitive edge in marketplace (Girón et al., 2007; Yang & Shafi, 2020). The right combination of cutting-edge technology and craftsmanship is crucial. One of the ways to boost entrepreneurs' creativity and help artisans find new business opportunities is adopting the most advanced technologies (Agendadigitale.ue). Technological crafts demonstrate strong intentions to reflect Ian Hacking's perspective of new experimentalism, a desire to experience the added qualities of new materials, showing that the challenge is not redoing the handmade form but being acknowledged of how handcrafting can enrich the artistic process. Experimenting phase in technological crafts is considered a roadmap for gaining knowledge because it includes testing materials & techniques and their potentials, meanwhile not ignoring traditional techniques, but reinterpreting how to apply them in better ways. Being free to experiment without specific goals or targeting a specific design of an artefact, makes the work environment of a technological craft designer to be a lot better. Discovering something new and exciting is what gives the technological craft designer's passion its meaning. The technological craftsman knows how to use advanced equipments, which could be his own or even rented. A crafts designer must know and must control all stages of the production process, from conception to commercialization. The practice of technological crafts relies totally on the complete communication among the team. There are many examples of design practices that fall into this mode of technological crafts. The work of Massimiliano Adami, the Italian craft designer who developed a production technique that includes both the attitude of creation from a diverse range of available things, and a feeling of an artistic nature, demonstrating unique efficiency for industrial invention;(figures1&2) is a great example for technological craft designers who are experimenting and open up new experiments & technical innovations. The work of the designers from around the world in the "the intelligent hand" competition, (figure3) which basically called for a unity of hands & mind of the designer, manual skills, creative &critical thinking could not be abandoned as examples for design practices that fall into technological crafts as well. In such practices the designer invents new techniques and experiments with new materials, using his manual and creative thinking skills. Technological crafts designers ignore the usual constraints of a specific goal, budget, or even delivery deadline, they only focus on the potentials for innovation to gain a unique product later on.

Figure1: The production process uses thermoplastic and heatto create unique furniture pieces without the use of molds.((https://www.designboom.com/design/massimiliano-adami-elettroshock-furniture-11-30-2015/)

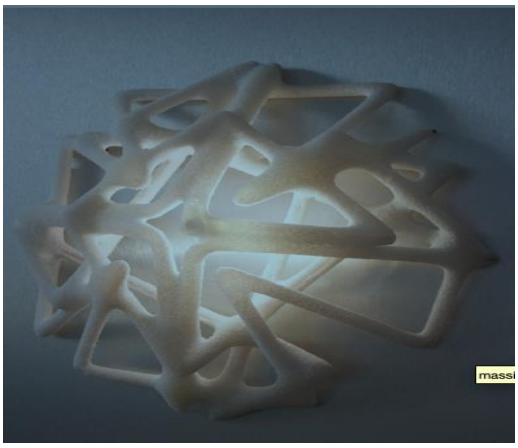

Figure2: Through the elettroshock process adami is able to create serial, yet one-off furniture. pieces(https://www.designboom.com/design/massimiliano-adami-elettroshock-furniture-11-30-2015/)

Figure3: The intelligent hand competition that took place in 2015 first prize o "light lamp" https://www.designboom.com/project/schlagschatten-a-lamp/

Experimenting of the techniques and materials

Here, the researcher conducts her own experiments by experimenting with materials & techniques to get deeper understanding of technological craft design. The experiments include fields of the researcher' s own experience.

Experiment 1:

Discovering unexpected materials to use in jewelry making:

The designer wanted to explore new materials to use in the making of centerpieces in jewelry design, based on her extensive experience in making jewelry for local markets using wires from different materials, resins and air-dry clay.

Figure4: Experiment 1 Steps

Material to test: Cement, air dry clay, epoxy resin, resin pigments, golden leaves and spray glue.

Required technical knowledge: Materials handling (molding processes, degassing, silicone rubber preparation for mold and molding process, wire forming, finishing (resin finishing, gluing, sanding, texture, and coloring).

Required aesthetics Knowledge: Form giving, color matching, texture, and market trends.
Required Manual skills: Forming air dry clay, spreading sand gesso mixture, and fixing golden leaves.
Required scientific data: Finding a suitable surface to spread sand on, gesso mixture, and keep it playable by wrapping it around the cylinders.
What's new: To allow the cement to be in a soft malleable form, researcher used transparent after dry glue, high cement ratio caused faster hardening time which isn't desirable. The researcher tried three materials; fast dry cement, corn flour, and powder putty. Both cement and powder putty caused the dry clay to become brittle and to break easily, corn starch worked well.
Procedures: Because the water and cement mixture have a short curing time and the mixture is difficult to form, the experiment began by adding the cement to the clay and removing water from the cement. The mixing process began adding the premade cement mixture to the air-dry clay, and the desired ratio was 1:2 air-dry clay to cement mixture, the concave shape was created on an old lamp at the bottom of spray cans, left to dry and then removed from the mold at room temperature. Spray adhesive was applied to the desired areas of the concave shape's surface, and the golden leaf was added and perfectly aligned with the excess being discarded. Epoxy resin was prepared according to manufacturer instructions and was poured in a circular mold after adding a dash of alcoholic black ink and stirred well, then left to dry for 24 hours to complete curing process. It was then vacuumed for 3 minutes, as an optional technique, other pieces were painted using automotive paints that were applied to a water surface by adding a few drops of paint to the water surface, and the dry formed clay was dropped in the same bowl (figure4). The paint stocked to the clay surface creating endless compositions.
Final product: The final pieces were versatile and could be used in many artefacts like necklaces, bracelets, and keychains, extra….

Experiment 2:

Experimenting with aluminum foil rolls: The designer used her extensive experience in mixed media painting to recycle aluminum foil rolls. The result was the upcycling of the compressed paper rolls.

Figure5: Steps of Experiment 2

Materials to test: Sand, gesso, water-based wall varnish, spray glue, golden leaves & acrylic paints.

Required technical knowledge: Material preparation (sand texture making, transferring texture, mixing gesso with other materials), preparing acrylic paints for use, finishing (adding glue, sanding, adding texture, coloring, gold leaves fixing and lastly removing excess gold leaves).

Required aesthetics knowledge: Form giving, color matching, texture and varnishing.

Required Manual skills: To complete the experiment, manual skills such as mixed media painting, molding, sanding, gesso, fixing golden leaves, gesso/sand mixing, and assembly are needed.

Required scientific data : Polymers technology, Polyethylene characteristics and material behavior.

What's new: The sand and gesso mixture was just not strong enough to hold the desired texture around the cylinders, adding transparent glue helped to achieve this.

Procedures: The experiment started by adding 1 part gesso to 12 parts sand followed by mixing them well and spreading it straight on the cylinders. Controlling the spread was difficult and the results weren't good. Thus, the idea of spreading the mixture on polyethylene sheets and transferring it to the cylinder was attempted yielding satisfactory results with one downside being increased drying time. The mixture didn't hold on to the polyethylene sheets, but it hardened and broke when attempting to wrap it around the cylinder. Therefore, an attempt to change the gesso/sand mixture's properties was done by the researcher using three materials. Two of the materials (cement and powder putty) failed to achieve the desired elasticity, making the mixture more brittle. An hour after spreading the mixture on the polyethylene sheet, the sheet was left around the cylinders for 24 hours, the third material (white glue) was able to accomplish the needed elasticity. The texture was perfectly adhered to the cylinder when unwrapping the sheet, and the entire cylinder was then coated with gesso. Cylinders were left for two hours; the dried cylinders were painted with black acrylic. Acrylic was chosen due to its many advantages over oil paints. It's a mixture of water, acrylic resin, and pigment particles, and because of these ingredients working together paint is made flexible and elastic. Then, spray glue was applied where golden leaves were to be fixed, gold leaves were added carefully and quickly, followed up by removal of the gold leaves using a rough hair brush (figure5).

Final product: The final product would be versatile by changing height and/or diameter, and it could result in many different items such as vases, table napkin holders, pen holders, side lamp bases, invitation card boxes, , and gift boxes when a led is added.

Experiment 3

Experimenting with unfamiliar sources for master models in liquid silicone rubber molding crafts. The researcher has good experience and background in mold making through her own experience in designing and making of things like lamps and wall watches for the Egyptian local market. In this experiment the final product was versatile in designing different products, and the decision was to choose a cheap source for the master model. Finally, a proper material would be poured in the mold to create the duplicates. Stones were selected to be used in the making of the master model, it is free, durable and available in endless forms and sizes.

Figure6: Steps of Experiment 3

Materials to test: Collected random stones, liquid silicone rubber, epoxy resin, epoxy pigments, clay, wood for framing and duct tape.

Required technique knowledge: Material processing (clay preparing and handling, molding techniques, degassing, liquid silicone rubber preparing for mold and molding process) and finishing (master model finishing, sanding).

Required aesthetics knowledge: Form giving, color matching, texture and varnishing.

Required Manual skills: Manual perfection in forming polymer clay, molding & sanding epoxy resin, fixing golden leaves, cement mixing & Assembly methods is another skill needed to finish the experiment.

Required scientific data : How Epoxy Resins reacts with pigments, with heat and its curing time?

What's new: The use of stones to create master models is a rich source for tests and experimentations. Endless possibilities& applications are expected with each time experiment.

Procedures: The experiment started by building a composition of stones by pressing them on a 30*30cm clay square with a height of 1.5 cm in a wood frame of a height of 3 cm. The liquid silicone rubber was prepared according to manufacturer instructions and poured over the master model then left to dry for 24 hours (mold is made of Poly 74-20 liquid rubber). Needed Casting material "Epoxy resin" amount through the following equation: (L" x W" x H") then, Subtracting mold volume from the mold box volume and the results taken from this calculation was divided by the specific volume of the Poly 75-80 (26 in^3/lb), this final result is the amount of epoxy resin needed. The epoxy was colored after degassing and poured directly over the framed master model starting from the corner till the whole master model was submerged with a ½ inch layer. Epoxy resin was allowed to cure for a day, as it appears in figure 6, the master model duplicate was used in two designs. One of the duplicates was split into 4 parts, then fixed on acrylic sheet, heated, folded and then cooled down to room temperature using a wet piece of

cloth, needed accessories and were fixed together; the final design was a side lamp. The other duplicate was used directly as a wall watch after adding the needed accessories (figure6).

Note: as it appears in (figure6), gypsum was poured into the mold with reinforcement fibers used in construction to produce wall decoration panels and also small designs were made using the same technique to fit other purposes.

Discussion

Experimenting with every facet of craft creation leads to a level of enjoyment that allows craft designers to quickly develop their self-production work. Experimentations fields are limitless, but to succeed and not to backfire at the craft designer's face, it requires basic knowledge and skills related to certain aspects. Some self-experimentations done by the researcher in her field of expertise as a professional craft designer helped to figure out what are the most important aspects to consider when practicing experimentation in crafts design or what we refer to in the research" Technological crafts design". As it was planned main points are:

1-	Materials to test
2-	Required technique knowledge
3-	Required aesthetics knowledge
4-	Required Manual skills
5-	Required scientific data

Those five elements could be classified under three important aspects for the best Technological Crafts Design Practice, materials to test will go under the aspect of material. Required technique, required manual skill and required scientific data will go under the aspect of technique. Required aesthetic knowledge will go under the aspect of form.

1. Technique

Technique refers to any branch of engineering experience related to manufacturing and finishing, making and assembling which may include the steps and the equipment. We need to emphasize the skill in applying the technique. A skill is a technical skill that is primarily in the form of tacit knowledge, which is used to achieve certain desired outcomes. It involves mastering a particular material, such as wood, metal, or resins. This knowledge, as peter Dormer (1997, 229) explains, is impossible to express in words and distill into a general idea. It is demonstrated by example and comparison. Craft know-edge and knowledge is harder to acquire by reading than by doing, face-to-face with a competent practitioner and educator, according to Dormer (1994, 11). Technique refers to engineering, not just any machine. Which refers to "all the means and processes by which the useful potential of all materials is realized" (Fulton 1992, p. 1). Before experimenting with a technique, a craft designer must first master that technique. Craft designers are expected to approach each problem of their designs from a new angle. Designers, as Raymond Guidot explains, that a designer must be aware of the advancement of new technologies, materials, and production techniques. To sum up, it is vital for technological anticraft designers to master technique and technology to incorporate them into their practices so they can experiment in it.

2. Material

The term "material" refers to "any physical substance from which things can be made or used for a certain purpose" (Fulton 1992, 1). Using one particular material would prevent a more cost-effective, more effective, more attractive appearance. All materials exist in one of three states of matter, according to Williams (1981). They are liquids, solids, and gases, the crafts designers seem to have freedom in exploring and using different materials for expressing their ideas. Ritter (2007, 24) notes that "it is familiar for crafts designers to seek out new ways of expression. Manzini (1997) found that people divide materials into two main groups, traditional and new materials; this could be a start for craft designers.

2-1 Traditional Material

Traditional material refers to all kinds of raw materials used to make traditional objects. It is taken directly from nature without relatively complicated transformation processes. Usually, but not always, the traditional materials are classified as natural materials, like stones, wood, bamboo, clay, sand, and rubber. Some materials, such as plants based fibers, might be strongly associated with local culture. Many of them are quite specific, very local, and available only in certain areas. According to Williams (1981), natural materials are diverse not only in their types, but also change character from each individual section to section.

2-2 New material

Materials used in everyday life are becoming synthetics, including plastics (polythene, polystyrene….), synthetic fibers (Nylon, Acrylics, and Polyesters), synthetic resins, and synthetic rubber. Nowadays, scientists invent new materials at a growing speed and in growing numbers. This has resulted in, as Ezio Manzini (1997) expresses, " nameless materials". Manzini argues that these materials create a dilemma in the traditional relationship that we once had with materials. In this new world, we seem to perceive only surfaces and appearances. In contemporary technical and cultural phase, appearance has in general become the reality to which we can refer (Manzini 1997, 31). Materials that may possess "intrinsic functions that assist them to behave either as a sensor or as an actuator" (Granier 2006, 214). These materials are called 'smart' because they can spontaneously change their physical properties (i.e., shape, conductivity, color, viscoelasticity) according to a natural or manual trigger, for example temperature change, having magnetic or electrical field, or using stress. To sum up, material as an aspect to foster technological crafts design, one should admit that without material, crafts will not exist. Craft designers must select the right material for their creation. In order for crafts designer to experiment with materials and benefit from it to the most, experience in using it is not the whole issue, actually, knowledge of its functional science and characteristics is essential. choosing materials, as Granier (2006, 257) explains, must be dictated by the specific attributes of crafts in question. When the main purpose is for mechanical strength, one can explore metals, composites, polymer concrete, or particular wood derivatives. If main concern is not related to the strength, but the texture and surface quality are, one can turn to wood, stone, clay, resins and other expressive materials. Besides aesthetic and technical aspects, considering the material from a wider perspective is an important issue, especially from the ecological dimension.

3- Form

When we refer to any craft, form, function, visual, and physical characteristics, should be included. It also involves understanding conception of gestalt, size, structure, and proportion. The term 'form' usually refers to the surface contours of an object, while it refers to permanent forms seen or felt in solid bodies (Mänty 1985, 31). Form is the first thing to grab the customer's attention to an artefact. The position of form in any craft is often overlooked as crucial. Any form of material we use derived by its purpose, wealth, access, and technique, also material (Pye 1978, 43). The shape and form of products with industrial nature, based on industrial design history, it can determine whether or not the product will be marketable. In design work, Raymond Loewy said in 1953 that the perfect balance is in relationship of form, material, and function. Harmony, according to Loewy, is not only vital to a product's attractiveness, actually to its commercial success as well. The shape is also supposed to reflect the function, such as, its usage, what type of function the craft performs, operated, and maintained. This importance has been embodied in the design maxima developed by architect louis Sullivan in 1896, which was coined by the same name. The frog design company proposes the expression 'form follows emotion', while victor Papanek (1995) suggests that 'form follows fun'. more recently, the shape of an object is expected to influence its designer, manufacturer, country, and culture (Vihma 1995, 57). Together, form and function affect how the consumer thinks about a product, and consequently affect consumer choices when buying a product (Hertenstein, 2005). Product functionality and the benefits delivered are not apart from its form, but are related in a positive or a negative relationship. Industrial design research addresses the need to reflect consumer needs (Clarkson, 2009).

The aesthetics of a product must address at least "what does the product do, how is the product form helping to convey its functions, and in what kind of environment does a product seem to belong?" (Vihma 1995, 56). There are ten criteria for a good form, as seen from the perspective of engineering product design: Practicality; reliability; a long, useful life; ergonomics; originality of appearance; and relation to environment. Best design for the consumer should be visually pleasing, which can be expressed as an arrangement in sync with manufacturing design and assembly (Ibid. 20-21). Mantee isn't the only one who advocates returning to the basic form; there is actually a basic form, a functional and ideal form, theoretical and abstract. The functionalist, according to Vihma (1995, 18), believed that the expansion of standard type forms would lead to a reduction of basic forms and eventually result in an anonymous form without references. For designers, a simplified and 'natural' product form is often considered as a design ideal. According to Lidwell, Holden, and Butler (2003, 90), it is timeless and enduring, but general customers consider it boring. Mantee argues, that since there great number of possibilities of forms for each craft, it is up to the designer to make a decision. What's most important, he says, is how to give the craft the meaningful form in its environment. Sometimes, additional ornamentation in some object or building may be considered a functional requirement in case of being meaningful, if such ornamentation for example describes an identity (i.e., a symbol). Form one of the three aspects of technological craft Design as it expresses the function, makes it better and attract the user, one must be able to give form; visual and figurative comprehension is vital in this regard. This involves designing the sense-uniting colors, also a theory of using and developing materials. Experimenting in crafts doesn’t mean we don’t have to give a good form, people like. Form is an aspect to foster technological crafts design, one

should admit that without form, crafts will not succeed to nail its main target which is being desirable for customers. Craft designers must give the best form to their creation. In order for a craft designer to be able to give a strongly aesthetically pleasing form a mix of material knowledge, technological form giving techniques are essential.

Conclusion

Ian Hacking's work broadened the conception of experimental craft design. Craft Designers must master the rules of their practice and that makes them able to break it seeking innovative ideas using the concept of experimentalism invented by Ian Hacking to discover new areas that would lead to innovation. Donald A. Schön's (1938), opinions have been appreciated by the design & crafts design communities. Schön looked into experimentalism, and his main concern was the way professionals overcome problems their daily practices challenges and he came up with the concept of related to how practitioners should try solving design issues through experimenting. Technological craft design depends on being not tied to any specific conditions, like dealing with certain materials, techniques or even delivery timeline. There are so many aspects that can affect crafts design but when experimenting to develop a product, technological crafts designers should be powered by certain aspects that can help him to experiment with safe precautions, and strong focus where he is heading with those experiments, it is simply the art of breaking the rules. the researcher considered three aspects as the best to help designers innovate new crafts through the New Experimentalism of Ian Hacking and the practitioner's reflection-in-action" of Donald A. Schön. Based on the research, those aspects that would help to nail the best technological craft design practice are, Techniques, Materials& Form. The designer must have enough experience to experiment with techniques, materials or form and that's why mastering these aspects can ensure best practice in technological crafts.

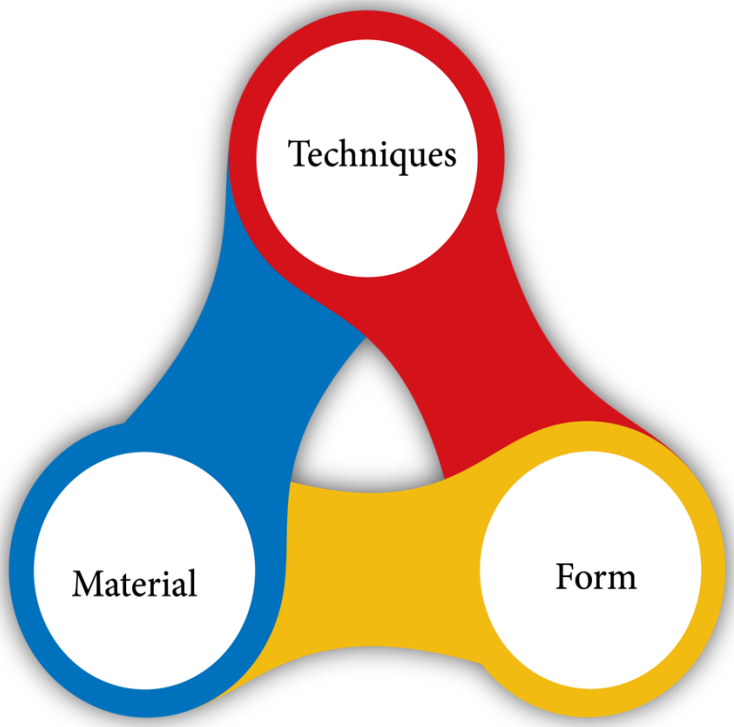

Figure7: Aspects for best technological crafts practice

Recommendations:

Materials& techniques used in crafts are endless because of the concept of technological crafts and with the rising concern of environmental issues and sustainability, technological craft designers should pay attention to pursuing alternative solutions through the consideration of sustainability. For this reason, one of the research recommendations is to start forums based on technological crafts to help spreading the concept and its knowledge in an applicable way. On Academic research level, connecting Experimentalism as described by Ian Hacking and technological craft design still needs to shed highlights on the issue. This research touched the surface of the topic; Technological Crafts from sustainability perspective needs further studies. On professional level, collaboration with industry seeking mentorship for young entrepreneurs is indispensable to develop national Technological Crafts Design.

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