BUT IN PRACTICE:
DISCOVERING THE HYBRID OBJECT MAKING APPROACH

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submitted by **MARSHALL PLUMMER** in partial fulfillment of the requirements for the degree of **Master of Science in Industrial Design, Middle East Technical University** by,

Prof. Dr. Halil Kalıpçılar
Dean, Graduate School of **Natural and Applied Sciences** ________________

Prof. Dr. Gülay Hasdoğan
Head of the Department, **Industrial Design** ________________

Prof. Dr. Owain Pedgley
Supervisor, **Industrial Design, METU** ________________

Examining Committee Members:

Prof. Dr. Çağla Doğan
Industrial Design, METU ________________

Prof. Dr. Owain Pedgley
Industrial Design, METU ________________

Assoc. Prof. Dr. Valentina Rognoli
Department of Design, Politecnico di Milano ________________

Date: 25.11.2022

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: Marshall Plummer

Signature :

ABSTRACT

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Plummer, Marshall
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Supervisor: Prof. Dr. Owain Pedgley

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This exploratory research tests a plausible new paradigm for object creation that combines the benefits of mass and local production scales by distributing standardized, objectively designed components to local artisans. The goal is to provide agency to one-off and batch producers in order to create what may be termed hybrid objects. The nature of the hybrid making approach is uncovered through the research.

This research utilized a research-through-design (RtD) methodology in order to better understand the new making paradigm. With a stool chosen as a vehicle object, the researcher designed and produced objectively ergonomic seat pan components within mass-manufacturing parameters. These parts were then distributed to nine central Anatolian artisans for use in novel seating objects. No design instruction was given to the participants. Once created and returned to the researcher, submitted stools were analyzed based on design and workmanship criteria. Each maker was interviewed in order to supplement submissions with maker's opinions on the hybrid making approach.

The submitted objects are diverse in design approach, workmanship philosophy, and capability. Object appraisals and interviews indicate that the hybrid making approach improved object utility and had a mixed impact on object narrative. Artisans of different original capability levels are affected by the approach in different ways, with experts being most capable of harnessing benefits while simultaneously mitigating limitations. Artisans were optimistic about the incorporation of hybrid making into their businesses and into the small-scale making industry, demonstrating alongside the submissions the potential in the hybrid making approach.

Keywords: Hybrid making, workmanship, scale of production, utility, narrative

ÖZ

ASLINDA UYGULAMADA:
HİBRİT NESNE YAPMA YAKLAŞIMINI KEŞFETMEK

Plummer, Marshall
Yüksek Lisans, Endüstriyel Tasarımı
Tez Yöneticisi: Prof. Dr. Owain Pedgley

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Bu araştırma, hibrit nesneler olarak adlandırılabilecek şeyleri yaratmak için tek seferlik ve toplu üreticilere temsilcilik sağlamak amacıyla standartlaştırılmış, nesnel olarak tasarlanmış bileşenleri yerel zanaatkarlara dağıtarak seri ve yerel üretim ölçeklerinin faydalarını birleştirmeyi araştırıyor. Melez oluşturma yaklaşımının doğası ve geçerliliği araştırma yoluyla ortaya çıkar.

Bu araştırma, yeni yapım paradigmasının faydalarını ve sıkıntılarını daha iyi anlamak için tasarım yoluyla araştırma (RtD) yaklaşımını kullandı. Araç nesnesi olarak seçilen bir tabure ile araştırma ekibi, seri üretim parametreleri dahilinde objektif olarak ergonomik koltuk tavası bileşenleri tasarladı ve üretti. Bu parçalar daha sonra yeni oturma nesnelerinde kullanılmak üzere Orta Anadolu'daki dokuz yerel zanaatkâra dağıtıldı. Zanaatkarlara hiçbir tasarım amacı verilmedi. Oluşturulan ve tasarım ekibine geri gönderilen tabureler, tasarım ve işçilik kriterlerine göre analiz edildi. Hibrit yapım paradigması hakkındaki görüşleriyle sunumlarını desteklemek için her üreticiyle röportaj yapıldı.

Gönderilen nesneler tasarım yaklaşımı, işçilik felsefesi ve yetenek açısından çeşitlilik göstermektedir. Nesne değerlendirmeleri ve görüşmeler, hibrit oluşturma yaklaşımının nesne faydasını geliştirdiğini ve nesne anlatısı üzerinde karışık bir etkiye sahip olduğunu göstermektedir. Farklı orijinal yetenek seviyelerine sahip zanaatkarlar, yaklaşımdan farklı şekillerde etkilenir; uzmanlar, aynı anda sınırlamaları azaltırken faydalardan yararlanma konusunda en yetenekli olanlardır. Zanaatkarlar, hibrit yapımın kendi işlerine ve küçük ölçekli üretim endüstrisine dahil edilmesi konusunda iyimserdiler ve sunumların yanı sıra hibrit yapım yaklaşımındaki potansiyeli gösterdiler.

Anahtar Kelimeler: hibrit yapım, işçilik, üretim ölçeği, fayda, anlatı

Dedicated to Selin, Filiz, & Turgut

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TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

The aim of this research is to create foundational insight about the nature of hybrid objects as defined in detail in Chapter 2 of this thesis. Briefly, a hybrid object is an object in which multiple scales of production are clearly leveraged in order to better achieve a design ideal. The research is designed to assess the validity and potential of the hybrid making approach. The work is not problem based, but instead is exploratory, designed to test new ideas for a potentially plausible new paradigm for making artefacts that gives a new agency to local artisan makers while improving objects available to users in general. As hybrid making is a new term, all secondary questions are built upon the foundation of the primary research aim; these secondary questions are listed here:

- *Does the hybrid making approach yield objects with utility?*
- *Does the hybrid making approach yield objects with narrative?*

- *What affordances and limitations do hybrid objects carry from their parent paradigms?*
- *What new affordances develop with the use of the hybrid making approach?*
- *What are the inherent limitations of the hybrid making approach?*

- *What do artisan stakeholders think of the hybrid making approach?*
- *What kind of design guidelines are appropriate for the creation of components that will be distributed and used in the hybrid making approach?*

1.1 Broad Objectives

Hybrid objects, as defined in this thesis, are an attempt at creating a path forward towards a more colorful world of everyday things. The idea stems from a belief that the homogeneity of the built world is an unnecessary limitation, and that the convenience it affords can exist in a more diverse built world as well. The broad objectives of this research reflect an attempt to mix existing systems in order to inject diversity into homogeneity, locality into globalism, and potent narrative into diluted concepts. Several potential benefits are listed here:

- *Hybrid objects may have inherently strong narratives*

  Because their manifestation is novel, hybrid objects may create strong bonds with their end users by reflecting their making journey. It is possible that the allure of local artisanship as it already exists may transfer to hybrid objects as well: the farmer's market-style experience of local connection may still bring life to objects even if they include mass manufactured components.

- *Hybrid objects may have sound utility*

  The utility of hybrid objects may be on par with that of typical mass-manufactured things, so long as the component distribution between mass and locally made parts is ideal. Incorporation of mass-produced components may grant artisans access to precise, performance-driven features otherwise unattainable or infeasible at small scale.

- *Hybrid objects may invigorate local making communities*

  If hybrid making augments local production instead of replacing it, local makers may benefit from the added work and demand for objects they are able to make. If this paradigm is sustained over time, new local making traditions may emerge, forging new traditions and identities (as well as opening new markets). Even if work is only satisfactory in quality, purchasers may still be inclined to support their local community or geographic region. In this case local expertise may grow over time on the foundation of steady demand.

- *At scale, hybrid objects may create a more diverse world of objects.*

  Homogeneity from mass production is a symptom of that paradigm's suffocating pervasiveness. Because mass production is so incongruent with object diversity (both within an object and between objects) (Pye, 1968), the collection of things in the world is more banal than it may need to be. Hybrid objects may reintroduce locality and individuality without sacrificing too much efficiency.

1.2 Industrial Design, Crafts and Scope of The Research

Because the hybrid making methodology outlined in this thesis is novel, it is necessary to look to adjacent topics to provide the context and explanation for its existence. To do this, the hybrid making approach is defined by determining its position relative to existing making paradigms. Specifically, hybrid making is explored in this thesis as a marriage between the benefits (or frustrations) of the traditionally utilitarian, industrial design, workmanship of certainty paradigm, and the narrative-rich, local maker, workmanship of risk paradigm.

Within design, concepts such as halfway design and open design attempt to be antidotes for the same homogeneity that hybrid making targets; however, those are both born from design-then-manufacture ideologies, whereas the creation of hybrid objects demands a hands-on real-time materialization dialogue between design and making considerations.

The primary aim of this research is to determine if the hybrid making approach demonstrates potential within the Turkish cultural context. Any conditional aims that required a definitive answer concerning the feasibility and future of the approach are therefore speculative and restricted to the final chapter, Chapter 6: Discussion and Conclusion. Determining consumer interest in this making methodology, determining the global supply chain's willingness to participate in this paradigm, understanding the ethical and sustainability consequences of a future where hybrid making is incorporated, and measuring community engagement with this system are all valid questions that fall outside the scope of this thesis; the first step - and the focus of this work - is to better understand hybrid making.

This research primarily explores hybrid making with the aim of assessing its validity against existing manufacturing paradigms. This is because it is primarily against these existing paradigms that the new approach must establish feasibility or competitive advantage before later research into adjacent benefits is persued. The primary benefit to be manifested by the hybrid making approach, at least in this initial exploratory research, is its ability to create diverse objects for users. For this reason, secondary benefits such as sustainability and community engagement, despite being revealed as potential benefits of the approach through the research process, remain out of scope as to not dilute the exploration of the impact of this research on manufacturing.

1.3 General Approach

Utilizing a research through design (RtD) approach, the research followed the path of a hybrid-produced object through its product development timeline in order to better understand the benefits and frustrations of the new paradigm from the position of each supply chain stakeholder. A hybrid object can briefly be defined as an object that leverages multiple scales of production in order to better achieve its desired design ideal. With a stool chosen as a vehicle object, the first task was to design the seat pan as a mass-produced object using industrial design expertise and mass manufacturing product development experience. The seat pans were produced in southeast Asia and shipped to Turkey, where they were distributed to nine local artisans in central Anatolia to use in novel seating objects. No direction was provided as to the design intent of the final submissions beyond the requirement of creating a valid seating object. Once created and returned, objects were analyzed based on design and workmanship criteria from existing literature, and then each maker was interviewed in order to learn about their participation experience and opinions on the proposed hybrid making paradigm.

1.4 Thesis Structure

Chapter 1 (this chapter) provides general background and basic methodological information about the research. Chapter 2 defines hybrid objects, addresses other key definitions as they are to be used in this thesis, and contextualizes the hybrid making approach relative to existing making philosophies by examining adjacent case studies and schools of thought. Chapter 3 summarizes the methodology used for the research, explains the justification of the decision to approach the topic in such a way, and clarifies any departures from the typical research through design (RtD) methodology. Chapter four documents the RtD process in a journal-like storytelling style, cataloging chronological thoughts and adding new insights after completing data collection. Chapter 5 analyzes the artisan submissions and presents overall themes and insights. The final chapter, Chapter 6, recontextualizes the insights as they are situated in a more holistic understanding of design, manufacturing, and cultural context, and provides alternative paths forward for future research and practice related to hybrid objects.

CHAPTER 2

CONCEPTUALIZATION OF HYBRID OBJECTS

Chapter 2 defines hybrid objects as well as several other key terms used in this research before examining adjacent case studies in other cultures and time periods. The section concludes with a literature review of industrial design and craft making in the Turkish context. At the end of each section, the insights derived from secondary sources are applied to further define the hybrid making approach and justify the methodology outlined in Chapter 3.

2.1 What is a Hybrid Object?

A hybrid object is any object that clearly utilizes multiple scales of design and production in order to best achieve its design ideal. This is not a binary system: an object's hybridity is a measure of how much, and how apparently, it incorporates multiple scales into its end state.

For an object to be a hybrid object it is essential that not only multiple scales of manufacturing are present, but also multiple scales of design. David Pye defines the point of transition from design work to workmanship as the hand-off of the design *ideal* (Pye, 1968). The hybrid making approach seeks to build on this understanding by recognizing the workmanship within the design process before a product is actually made and, more clearly represented in this particular study, the immense form-giving agency inherent to workmanship. Top-down workmanship characterizes mass manufacturing and bottom-up design work characterizes craft production, but this research poses the inverse is, albeit to a lesser degree, also true.

Hybrid objects are already common in everyday life: bespoke leatherworks use mass produced thread, batch produced ceramics may use mass produced molds, and like the vehicle objects in this thesis, one-off furniture may use mass produced hardware components or fabrics in user-facing ways. This being said, there are several examples of utilizing multiple scales of production without incorporating hybridity as defined for this research: car makers reuse interior components across several models, plastic storage boxes sometimes come in many sizes with a universal cap. In these examples the producer of the large and small volume parts are the same stakeholder, meaning they are only creating internal efficiencies and do not leverage multiple scales of design. Standard parts are common in some cases such as furniture assembly or consumer electronics PCB layout. However, hybrid making is less common in design approaches because problems are often so ill-defined or subjective. The hybrid making approach requires different stakeholders at different scales.

In design contexts where a producer limited by small quantity desires to increase efficiency by incorporating mass-produced, off the shelf parts, they may go to great lengths to hide "factory made" components because they detract from the "handmade" narrative, or myth, behind locally produced batch or one-off products. The leatherworkers from the above example may avoid synthetic or glossy threads, the ceramicist may add a unique finish or disguise parting lines, and the furniture designer usually hides the connection hardware below the user-facing surfaces on their product. These are all examples of using multiple scales of production out of necessity and do not deliberately celebrate the hybrid paradigm.

2.2 Addressing Key Definitions

While this research's unique approach to combining high and low scale making has not been explored explicitly (to the best of the researcher's knowledge), several adjacent research fields provide helpful contextual insight that frame design context, production context, and local context to help define the boundaries of the new niche.

2.2.1 Craft and Craftsmanship

Since the Industrial Revolution, words such as "craft," "craftsmanship," "handcrafted," have become as powerful as they have romanticized. This both clouds and complicates the contemporary view of "craft" to a point where ideally the topic would be entirely sidestepped in this research; however, it must be met head on to establish a shared understanding. In his essay "Skill - A Word to Start an Argument" from his book *On Craftsmanship* (2017), Christopher Frayling attempts to untangle these common terms to reveal some sort of consistent meaning. Frayling's thesis echoes many more contemporary definitions of craft in the British context, in which it feels like only in the previous few decades thinkers have been able to get out from under the thumb of William Morris and John Ruskin:

"The recent 'craft revival' is clearly based on a certain reading of English history, using evidence of the aesthetic (as well as the moral and ritual) value of certain English artefacts from the past as evidence of how these artefacts must have been both produced and consumed." (Frayling, 2017. Pp. 64)

And furthermore:

"The myth of the happy artisan - like the 'artist craftsman', craft guilds… did not exist until the nineteenth century, when it became part of a romantic reaction against the spread of industrial capitalism." (Frayling, 2017. Pp. 66)

This interpretation of current opinions on "craft" and similar terms shines light on the tangle of design, marketing, production, nostalgia, and naivety that produce today's cloudy definitions. David Pye, who is quoted for the title of Frayling's essay, passionately remarks "It is impossible to find a generally satisfactory definition for [craftsmanship] in face of all the strange shibboleths and prejudices about it which are acrimoniously maintained" (Pye, 1968, pp. 4). Just a few sentences later and immediately after making clear that he will be using the term workmanship in his writing instead, Pye begrudgingly defines craftsmanship as "simply workmanship using any kind of technique or apparatus, in which the quality of the result is not predetermined, but depends on the judgment, dexterity and care which the maker exercises as he works."

"Craftsmanship" will be defined for this research as the ability of a workman to manifest an object as they envision it. This definition aligns with Frayling and Pye on the grounds that it resists nostalgic interpretation. Craftsmanship is decoupled from any sort of nostalgia for previous production paradigms, instead simply meaning "ability to execute" a task where proper execution is not guaranteed. An object that possesses high craft is an object that clearly and accurately fulfills the object's utility and represents the object's predetermined narrative without distraction. This is not to say the concept must be entirely determined before making starts, only that the *utility* and *narrative* of the object are achieved. After all, leaving details to be resolved later in a bottom-up making approach is one of the great benefits of one-off and batch production.

Included in this definition of craft are obvious examples: a well-carved acanthus leaf ornament, a sturdy old dinner table, or a photorealistic and picturesque painting. But also included in this definition are other production-specific examples of expertise in execution: a well-written toolpath that reduces tearout, a hidden parting line that allows other formal aspects to shine, or a simple feature made possible by a brilliant jig all also qualify as good craftsmanship. These constitute non-guaranteed ability to execute because although the matter-changing step is assured, good workmanship of risk is still required beforehand to produce the desired effect. Good craft is not restricted to the nostalgic "Arts and Crafts", or even restricted to "the Crafts" in general. Good craftsmanship can be showcased in mass-manufactured objects as well.

2.2.2 Workmanship of Certainty & Risk

Borrowing from David Pye's definition, "workmanship" in this research will be the actions and decision-making required in order to execute a design concept in good faith (Pye, 1967). Also following Pye, workmanship of risk will be any operation where the final product's end state is not guaranteed, whereas workmanship of certainty assures consistent, repeatable completion.

2.2.3 Design Ideal

A design ideal is any given design's absolutely perfect, unattainable goal. It is the object as conceived and imagined, but not as it is produced: the design ideal is where joints align perfectly, surfaces are microscopically smooth, and materials are entirely controlled. Pye suggests that the handoff from the designer to the workman is the moment of transition between designing and making. A design ideal is not necessarily a complete design; often artisans in particular begin making without full concept resolution.

2.2.4 Utility

While design-specific values like empathy or emotional durability are certainly utilitarian features within objects, this research will use the term utility to mean explicit ability to perform an object's standard task. A stapler's utility is its ability to staple, a speaker's utility is to allow a user to listen to music, a screw's utility is that it holds two pieces of material together. Utility is linear, meaning some objects of the same type have better utility than others. Two suitcases may not be equally protective. Objects without utility are unable to perform the task for which they were made.

An object's utility in one use case may be disadvantageous in other circumstances. For example, one suitcase may be heavier than another, but more protective for fragile goods. Some benches are only designed to be comfortable for a short amount of time. These trade-offs about utility define niches within an overall object type. Subtle diversity in utility requirements creates compounding diversity in the product ecosystem.

2.2.5 Narrative

An object's narrative is the story told through its design. It is the information the object communicates to observers and users about itself, its maker, or its environment. Cohesive and intense narrative can create provocative artifacts, while diluted and disparate narrative can disrupt user interaction and connection to the object. Whereas utility creates objective justification for object existence, narrative creates emotional response and the ability to communicate between object and user.

2.2.6 Top-Down Production

Top-down production is an approach in which makers respond to a design ideal, and any divergence from this ideal is regarded as a mistake or an imperfection. In workmanship of risk this top-down design ideal is gradually approached by craftspeople; in workmanship of certainty, it is approached rapidly or instantaneously. Top-down production is helpful in long supply chains and large production runs because it is standardized and simple to regulate.

2.2.7 Bottom-Up Production

Bottom-up production is a making approach in which the design ideal is continually adjusted as it is being materially conceived by the maker. In this process the design ideal shifts based on new information received within the making journey. The design ideal in this process is inevitably the object itself because, due to the design ideal being defined by the object, the two coincide as the object approaches completion.

2.2.8 Mass Production

For the sake of this research, mass produced parts share a general group of qualities that are characteristic of large manufacturing runs. Any given product may not meet all the criteria, and of course, "mass-manufactured vs. locally produced" as a quality is a grayscale instead of black and white. This research will focus on the most typical features of both, with many objects not fitting these convenient definitions. Mass-manufactured objects generally are:

- *Defined entirely by non-maker professionals*
- *Manufactured by a non-stakeholder*
- *Of consistent nature and quality*
- *Products of a global supply chain*
- *Adherent to national or international standardization*
- *Products of profit-oriented enterprises*

2.2.9 Artisan One-off and Batch Production

As opposed to mass production, one-off and batch production resides on the opposite end of the spectrum of scale. For the sake of clarity, batch production will include all sorts of typical small-scale enterprises, outlined by their characteristics here. Like mass-manufacturing, while no single business mirrors the paradigm, the patterns are as such. Batch produced objects generally are:

- *Entirely unique or part of a small object family*
- *Leveraging the benefits of workmanship of risk*
- *Non-identical*
- *Embodying non-financial maker incentives*
- *Products of a local supply chain*
- *Produced by experts with tacit knowledge*

2.3 Hybrid Objects in a Design Context

The hybrid object approach is conceived based on manufacturing constraints more than design constraints, and therefore exists primarily in the practical rather than the theoretical. Because of this the role of industrial design in hybrid making takes a back seat to the people and processes responsible for actually manifesting the research object, at least in this first attempt to gain knowledge of this hybrid making approach. Answering the research question “What are best practices for industrial design in a hybrid manufacturing process?” is a secondary research question that can only be usefully addressed after determining the validity of the making method itself.

Once addressed, the hybrid making paradigm does stand on a similar foundation as two existing design approaches: halfway design and open design. All three approaches seek to diversify the stakeholders behind product development, de-monopolize designing and making, and provide opportunities to adapt products more appropriately for each user’s unique circumstance. All three approaches provide an alternative to the top-down, static, homogenous world of mass-manufacturing by allowing stakeholders nearer to the end user greater design agency. Hybrid making differs from these two other concepts because it is a proposed strategy to exit the current making paradigm, rather than, like these other concepts, an ideal which must be approached in uncertain ways. Hybrid making is a road away from the current manufacturing systems, with an unclear destination in mind. Halfway design and open design are clear destinations with an ill-defined path connecting them to today’s circumstance.

2.3.1 Halfway Design

Halfway Design uses the standard industrial design manufacturing paradigm to create partially made, or halfway designed, seed objects. In this design approach the users themselves complete the product. Completion can mean decorating an already functional product, assembling a disassembled or kitted product with directions, or entirely designing and creating a novel intervention (though like hybrid making this will always be in response to the inevitable narrative included by the distributed component). The essential facet of halfway design is that the user becomes a stakeholder in the designing (and usually making) process from which they will benefit during object ownership (Dogan & Walker, 2008).

Halfway design affords users the opportunity to directly define the objects in their life without compromising to accommodate a large, minimum order quantity (MOQ)-driven user group to which they may barely belong. Halfway design may also create pride, and therefore connection, between users and final objects: objects' caretakers are more likely to develop meaningful, narrative-driven connections with their halfway designed objects (Eren, 2022). This in turn increases likelihood of product maintenance and repair.

Like hybrid objects, halfway designed objects are manifested by two or more non-collaborative parties. They are non-collaborative because while the designer and the user may have similar intentions, they do not communicate during either of their respective designing steps. The designer and manufacturer's contributions are set in stone before the user, or finisher, is able to exercise any influence on the object beyond what the user or user group abstractly represents in the typical industrial design process. Once the finisher receives the halfway designed seed object the designer has no agency as to how the finisher will choose to define the remaining unknowns. The role of the standard ID and mass-manufacturing paradigm in halfway design is its typical top-down role, whereas the user's role is to respond to the given seed object. It is worth noting that while mass-manufacturing production methods are not necessary for the seed object to qualify as halfway designed, the seed object must be designed for at least a small group of like users. This creation of multiples differentiates the seed object from the variations upon it.

Most notably, halfway designed objects differentiate from hybrid objects on the topic of who is completing the given part. Halfway design leverages each user's unique desire, and at least in theory their capability, to finish their own products. The proposed hybrid manufacturing paradigm as explored in this research uses artisans and the bottom-up craft economy to finish objects instead of users themselves. Halfway design may be seen as the more intense manifestation of hybrid making: in halfway design each user is tasked with their own creation, whereas in hybrid manufacturing users are placed into smaller user groups based on taste or community. Both respond to the homogeneity of traditional ID and mass manufacture with strategies to mitigate unwanted features caused by the lowest common denominator, however, the scale of the smallest unit is different.

This difference in scale of the product finisher is significant. Halfway designed objects rely on laymen's use case and product understanding, design capability, workmanship capability, and interest in the project to be successful. Furthermore, halfway designs may become so heavily individualized that they have no place, and therefore no use, beyond their initial owner. Hybrid manufacturing mitigates these risks and requirements by looking towards the craft community as a sort of knowledgeable, capable group, straddling the line between making understanding and local cultural connection. Their inclusion may also reduce the emotional energy required by the user to attain an enjoyable product. While hybrid objects are likely to possess unique cultural or niche user group facets, these objects are probably not so individualized that they reduce product lifetime based simply on taste.

2.3.2 Open Design

Open design is an overarching term used to define any sort of crowdsourced, democratized design process. It stands in contrast to the verticality behind the traditional ID & mass manufacture paradigm by proposing a horizontal network of stakeholders with individual incentives. Raasch et al. define open design as the hardware-specific side (as opposed to the software side) of their umbrella term Open Source Innovation (OSI) (Raasch et al., 2009) (Vallance et al., 2001). The four critical aspects of OSI can be paraphrased as such:

1. *A non-market, non-contractual transfer of knowledge between actors involved in invention and those involved in exploitation*
2. *The sharing of ideas between actors in order to achieve joint development*
3. *A single, integrated design or small family of adjacent designs*
4. *The developed design is used for market or non-market purposes, or in other words, is utilitarian.*

Originally a term for software development, the rise of hardware-based open design has been catalyzed by the growing availability of maker spaces and cartesian production methods such as 3D printing and CNC machining (Aitamurto, Holland, & Hussain, 2015). Nevertheless the paradigm's roots in information exchange rather than physicality remain apparent: tangible products that require actual physical production is often a pain point for the approach (Maurer & Scotchmer, 2006).

Although developments in production have unlocked the potential of open design, open design itself is inherently a design process rather than a manufacturing process. In open design local making is what affords the manifestation of global crowdsourced design solutions. This varies from hybrid making because in open design local making capabilities create opportunities to cast a wide net, whereas in hybrid manufacturing local making capabilities create opportunities to focus on locally, culturally specific contexts. Potentially mitigating this difference is open design's ability to afford mass personalization, however, the primary value addition is its penetration into traditionally top-down parts of the product development decision making system, not its ability to personalize or individualize (Aitamurto, Holland, & Hussain, 2015). Furthermore this product personalization mimics the advantages and disadvantages of halfway design.

2.4 Hybrid Objects in a Production Context

The hybrid making approach doesn't sit between mass and local production as much as it sits on each simultaneously. Whereas medium scale production exists as a blend of both paradigms, hybrid production theoretically employs both in succession from large to small scale, and is able to accommodate intermediate scales along the supply and production chain.

2.4.1 Expanding Definitions of Mass and Local Manufacture

Expanding on the brief definition from Chapter 2.3, mass production's characteristics can be determined as such:

- *Defined entirely by non-maker professionals*

  Primary to this research perspective is the distance in typical mass-manufactured objects between the object *designer* (typically an *industrial* designer) and maker. This distance can be physical, cultural, or professional, and is often all three. Beyond designer and maker, other product development and production facets are also usually siloed in the huge enterprises behind mass-manufactured objects - business professionals, researchers, designers, engineers, factory owners, workers, material suppliers, and so on and so forth all have specific jobs that together create large production run objects by committee.

- *Manufactured by a non-stakeholder*

  The other side of this same coin, manufacturers (as businesses or as individuals) often have only a contractual stake in the quality of the object they are producing - incentivized to meet standards rather than excel in craft. Generally manufacturers are not vertically integrated into point-of-sale businesses and thus are driven by different success metrics. This wicked manifestation of the principal-agent problem defines a shaky relationship between parts of the supply chain, driving design decisions upstream from production based on realistic quality assumptions. In international cases, these challenges may be exacerbated by challenges in daily communication and legal jurisdiction.

Furthermore, from the point of view of the manufacturer, the division between design-agent and production-agent often creates frustrations stemming from a lack of possible collaboration. The distance between an object's ideal form and an object's real manifestation can mean designers are unable to effectively produce reasonable concepts based on the maker's capabilities. Furthermore, this distance between actors along the supply chain necessitates top-down decision making about what a product is to be; downstream actors who may not be incentivized or able to determine or manifest the ideal product will inevitably be pigeonholed to roles of execution rather than roles of value addition. This means that mass-manufactured objects are their most pure as concepts, and any manifestation of that concept will be a lesser version of the purity exhibited in the idea of the product. In the most typical mass-manufacturing processes, workmanship of risk is entirely eliminated, with it eliminating any possibility that the production processes may improve the quality of the final deliverable (Pye, 1968).

- *Of consistent nature and quality*

Mass-manufactured objects are products of the workmanship of certainty, with reproducibility a key value addition in scaled production. Use of molds, dyes, homogenous materials and standardized surface finishes all simultaneously promote consistency while creating value as production runs increase. This being said it's important to note, arguing alongside David Pye once again, "the tools, jigs, and machines on which workmanship of certainty will always depend are simply the stored embodiment of care, judgment and dexterity exercised by the workman at an earlier time" (Pye, 1968. Pp. 25).

Regardless, all this workmanship of risk is performed and executed A) before the mass-produced object enters production and B) can always be redone if initially unsatisfactory without affecting the quality of the final product.

- *Products of a global supply chain*

The ability to produce at scale means, in many cases, the ability to break free of local hindrances. Labor traditions and production capabilities vary by culture. Material availability, quality, origin, and reliability vary by region. Producing globally allows companies to mix and match these local circumstances to design and produce objects that quickly become a homogeneous combination of a variety of origins, contexts, and cultures.

- *Adherent to national or international standardization*

Hand-in-hand with the benefits behind global production lay a tangled network of requirements, standards, and certifications required by countries in order to produce, ship, or sell a company's products in their jurisdictions. This complicated dance can hamstring even large businesses. Coincidentally these certifications, often large up-front costs in product development before a product is approved to enter the market, incentivize small and medium businesses to avoid international production and sales, further dividing the world of mass-production with local and batch making.

- *Products of profit-oriented enterprises*

Whereas not always true in local or craft production, mass-manufactured objects generally are produced for economic benefit of the primary stakeholders and investors (Ranson, 1989).

Also from Chapter 2.3, local production’s characteristics expanded:

- *Entirely unique or part of a small family*

  High workmanship of risk in a production process leads to reduced multiples efficiency, meaning makers and designers at this scale of production have greater incentive to differentiate subtly between products. Furthermore, as craftspeople often enter the trade in some part due to interest in the work itself, their curiosity or creative spirits may create further desire to produce a diverse set of work.

  Local producers still often use elements indicating the workmanship of certainty: jigs, patterns, molds, and so on and so forth are common in small workshops as well (Pye, 1968). Also, due to market restraints, technically unique products may actually be simple variations on a theme that an artisan has found will sell well: several of the participating artisans of this project utilize this strategy in order to ensure business while organically growing ideas, with each iteration adjacent to the previous one but nevertheless unique.

- *Leveraging the benefits of workmanship of risk*

  Pye writes “The greater part of all manufacture now is mass-production; in which, although there is some bad workmanship, much is excellent… the deterioration [of our object world] comes not because of bad workmanship in mass-production but because the range of qualities which mass-production is capable of just now is so dismally restricted” (Pye, 1968). Even taking into account the half century of technological development since this comment, the limitless variety of ways humans are able to define objects still reduces into only a handful of methods suitable for mass manufacture. All the other making strategies are only executable through workmanship of risk, and are valuable not because they are risky but because they are the only way to execute such a desired form.

- *Non-identical*

Pye argues that even mass-produced objects are not in every way perfectly identical, though also mentions that if these differences are imperceptible then they are irrelevant. In processes using the workmanship of certainty, these differences are almost always imperceptible unless they are meant to be showcased. One-off and batch manufacturing methods, with their use of the workmanship of risk, require no such deliberate effort to avoid homogeneity: along any process of gradual refinement, inevitable variation occurs from a number of uncontrollable (or at least uncontrolled factors). This gives small run products a unique diversity.

- *Embodying non-financial maker incentives*

Many craftspeople see their work as more than a means of making profit, often implicitly or explicitly sacrificing financial gain for opportunities to realize more satisfying work (Ranson, 1989). Smaller scale production generally aligns with a smaller reach and a smaller stakeholder group, meaning objects are created with their proximal community in mind. In this line of thought, craftspeople are often members of the cultural context or even user group which the final object will serve. At this scale new incentives beyond profit begin to affect the craftsperson’s method: social motivations may influence a workman to produce a certain kind of cultural piece (a *nazar,* for example), or to purchase materials from a friend, or more subtly simply not work in the evenings as to not disrupt neighbors with loud power tools. Additionally, when a maker's objects remain in the community in which they are made, these objects' quality can become benefits to the social status of the maker.

- *Products of a local supply chain*

  Whereas mass manufacturing leverages the efficiencies of a global supply chain, one-off and batch manufacturing typically remains in the niche of local making. This includes material acquisition, collaboration, and marketing. Even in circumstances where a local industry is globally distributed, its locality is often used as a primary brand cornerstone (Santagata, 2002).

- *Produced by experts with tacit knowledge*

  In processes that leverage the benefits of the workmanship of risk, a highly regulated (precise) feature is produced gradually from a rough object (Pye, 1968). This making process typically requires a strong understanding of the circumstances at hand, as the maker is constantly being tasked to assess the condition of the workpiece, propose a modification or action upon the workpiece in order to bring it closer to the final ideal, then ultimately reflect upon the consequences of that action.

While the two poles of mass-manufacturing and local making *are* mutually exclusive, there's of course space between the two paradigms that is a muddy, ill-defined middle ground. Certain aspects of workmanship of certainty often become steps in an overall workmanship-of-risky process (Pye, 1968). Projects in this middle ground therefore face a combination of mass- and batch-production advantages and disadvantages, which while fascinating and valuable to understand, are not within the scope of this research.

Distilling the values of both paradigms in relation to each other, it is clear to see precision, performance, and objectivity as the benefits of industrial design. Objects representing the industrial design ideal are appropriate, pervasive, and reliable. For artisanship, key benefits are stakeholder association, individuality, narrative, and deep representation of the maker's local community. A secondary aim of this research is to expose and better understand the relationship between the two paradigms when coexisting in a single object.

2.4.2 Reviewing the Affordances and Limitations of Mass Production

Industrially designed, mass manufactured objects have become so pervasive over the last century that anything not made in this fashion, at least in the west, is of note (Howlett, 1974). Indeed this paradigm has become so smothering that other ways of designing and making are defined as much against this as they are respectively in their own right. Workmanship of certainty "can do nearly everything well except produce diversity" (Pye, 1968. Pp. 73).

The industrial design creation paradigm is built to afford the highest quality of utility for a broad swath of unknown people, often only defined as a user group. Effective industrial design, or the top-down design of identical multiples, takes advantage of the cost-effectiveness, detail resolution, unique material and form opportunities, precision, and repeatability that scale affords (Campana, Cimattia, & Melosia, 2016). With all this said, the industrial design paradigm is not without its faults: by definition, objects made through this process require scaled production, promote homogeneity, and may be unable to accommodate the end user's unique desires with finesse or empathy. More so, the high stakes investment required for this scale of production keeps it out of reach for many small and medium enterprises. Finally, these disadvantages introduce environmental risk and open the door for any stakeholder's lack of care & dissociation from the making process, affecting object quality and user experience. The end result is a utilitarian, homogenous product paradigm that has no choice but to sacrifice subtlety, innovation, sympathy, and in many cases quality, in order to achieve the required scale.

2.4.3 Reviewing the Affordances and Limitations of Local Production

Many of our most beloved objects are one-off, handmade creations fabricated by experts with tacit craft knowledge. What makes these objects valuable is usually not their ability to perform a prescribed task, but rather their semantic, aesthetic qualities and the narratives they represent for us as unique individuals. Handmade objects reduce the distance between designer/maker and user, allowing for a deeper personal connection that can raise the value of the object beyond what is possible with industrial design. Of course, artisan products are not without their faults as well: typically they are expensive and difficult to source. Craft products can also be unreliable, untrustworthy, and are implicitly impossible to standardize. Artisan values and scale are often seen as mutually exclusive, restricting this design paradigm to local application (Solomon & Mathias, 2020).

Consumer demand for culturally or contextually specific goods has grown (Howlett, 1974) and is growing (Liebl & Roy, 2003). The implication of this trend is that the scale required to produce mass manufactured objects at a reasonable cost sacrifices a great deal of the individuality that makes an object desirable. Furthermore, consumers are willing to accept a higher price point and greater variation in quality, traditionally problematic characteristics of batch or one-off manufacturing, in order to associate themselves with a desirable cultural context. Whether for domestic or international consumption, products based on cultural heritage and local resources can invigorate local economic development (Santagata, 2002). As Frayling describes:

"It will be possible in the near future for whole industries to be made up of small interconnected workshops, each in specialized areas, each allowing for a large measure of control at the point of production within each unit, together catering for a market which wants well-made and customized products rather than badly made identical ones." (Frayling, 2017. Pp 81-82)

Artisan and designer/maker culture in developed western nations has blossomed in the previous decades as consumers wish to support their own communities (Jakob & Thomas, 2017).

2.4.4 Showing the Economic Value of Personalized Production

Thankfully an abundance of research has been published regarding product personalization and customization. In recent years, terms like "Smart Manufacturing," "Industry 4.0," and "self-organizing manufacturing systems (SOMS)" have become pervasive in manufacturing research literature as proposed strategies to streamline mass personalization in the market. These above terms all reference tech-based solutions to satisfy the diversifying demands of last-step manufacturing. "Smart Manufacturing" is used to describe a myriad of making methods that utilize tech in general. "Industry 4.0" is an umbrella term that refers to the most recent wave of tech advancements: 3D printing, CNC operations, big data and real-time planning algorithms are some examples. SOMS, as defined by Zhaojun Qin and Yuqian Lu, is the concept of "adaptively configuring autonomous manufacturing units (such as machine tools and automated guided vehicles) to achieve dynamic manufacturing job allocation" (Qin & Lu, 2021) - clearly an earlier but still relevant application of Industry 4.0 ideas and goals.

It is clear the industry and researchers agree there is a significant opportunity for profit and product realization if personalization were to be achievable at scale. From a design perspective, these potential margins open up opportunities to manifest greater, more interesting, more complicated concepts. Although the direction explored in this thesis stands opposite to these tech-centric paths proposed by others, the problem definition, context, and value of a successful mass personalization solution are helpfully outlined in ways that can similarly frame the research executed here.

Mass customization is a term first attributed to Stanley M. Davis, in 1987 (Davis, 1987), however, a more recent and usable definition comes from David M. Anderson: “the ability to design and manufacture customized products at mass production efficiency and speed (Anderson, 2004, p.271). As defined here this goal is unachievable as multiples will always remain more efficient than singular products, so therefore an asymptotic approach towards this defined ideal may be a more useful idea. Regardless, since its origin many articles agree mass personalization has become the next big opportunity in manufacturing, and with each technical and supply chain development these tech solutions are delivering companies closer to Anderson’s perfect efficiency realization (Koren, 2010 & Lu, Xu, & Wang, 2020). Companies gain competitive advantage by offering personalization or mass personalization options (Qin & Lu, 2021), shown by clear improvements in revenue and marketing-spend efficiency (McKinsey & Company, 2020). As Anderson’s perfect efficiency is approached, it is clear there are large prizes for businesses and consumers alike.

With each added element or feature, a top-down manufacturing process becomes exponentially more unstable. Especially when introducing new tech ecosystems, inefficiencies and compounding errors in high tolerance situations can balloon into unmanageable or catastrophic roadblocks. These risks may be deterrents for the small and medium businesses that, because of their inability to compete for efficiency and cost at the largest scales, have the most to gain through manufacturing flexibility for mass customization. In a 2021 survey designed to measure lean manufacturing and Industry 4.0 implementation in manufacturing companies today, “lean” tools and concepts approximately double the application of I4.0 tools (Marinelli et. al., 2021). The researchers suggest businesses may be hesitant to adapt to new processes because they are unproven relative to the “well-established and tested” lean production philosophy. Purchasing complex, precise, and expensive tools can be a large up-front cost for these businesses. Furthermore, finding well-trained employees to take advantage of the machines’ benefits remains difficult. It may also be difficult for I4.0’s systems to interface with those of other stakeholders in a scaled manufacturing system. These hurdles, though, stem from the novelty of these Industry 4.0 concepts; other risks and reservations may be more permanent even after the adoption and market saturation of these new technologies.

It may be possible that the pains of I4.0 are not only from adoption concerns but also from true skepticism surrounding the efficiency and resiliency of these systems. Perhaps the precision of high-tech manufacturing is an unnecessary risk and expense for final-step actions, and a leaner method may counterintuitively be more robust. Furthermore, the Industry 4.0 terms measured in the survey (such as Big Data Analytics, RFID, Robotics, and Cyber Physical Systems) may simply be overkill for most last-step, small scale making applications.

In summary, while Industry 4.0 approaches may not prove as resilient as would be required to achieve high levels of mass customization or context-specific product solutions, the problem definitions and incentives driving these initiatives may also be achieved through simpler means such as halfway design or the proposed hybrid making paradigm outlined in this research.

2.5 Hybrid Objects in a Cultural Context

Though similar research in Turkey is limited, relevant case studies from other cultures provide some support to the hybrid making approach. Many experiments explore relationships between locality and globalism, tradition and innovation, handicraft and mechanization, and the exportation of cultural commodity. Generally previous experiments of similar nature are, like this one, grounded in a specific culture with a desire to understand the relationship between the *local* (whether Turkey or elsewhere) and larger global patterns. Eventually it may be possible to parse together these studies to differentiate between global and culturally specific craft characteristics.

2.5.1 Taiwan: Instilling Culture in Commodity for Export

Two Taiwanese articles, both published in the *International Journal of Design*, explore commodifying a rejuvenated Taiwanese making culture for international recognition and increased export through adaptation of traditional practices into new making procedures that slot more appropriately into global supply chains and consumer preferences.

The earlier of these two articles, *Transforming Taiwan Aboriginal Cultural Features into Modern Product Design: A Case Study of a Cross-cultural Product Design Model,* "establishes a cultural product design model that is meant to provide designers with a valuable reference for designing a successful cross-cultural product" (Lin, 2007). Lin frames this case study by establishing Taiwanese culture's potential for export and identifying an opportunity to counteract the global market's trend towards homogeneity through "local features". The article goes on to propose the Cultural Product Design Model, a design tool that helps distill higher level cultural distinctions into physical product characteristics. Ultimately this paper outlines a strategy for introducing a cultural lifestyle as an export, based on Taiwan but itself applicable to other cultures.

Lin's framing of cultural identity as an antidote to the global market, where "products are losing their identity because of similarities in function and form" applies seamlessly to this research as well. Products with origin narrative create clear differentiation in an increasingly homogenous global market (Lin, 2007). The outlined Cultural Design Model also proves local culture can be manifested in forms methodologically and predictably (benefits for mass-manufacture supply chain inclusion). This means craft can be regulated.

The second Taiwanese article, *Weaving with Rush: Exploring Craft-Design collaborations in Revitalizing a Local Craft*, summarizes an experiment in which final-year undergraduate industrial design students collaborate with nearby rush-weaving artisans to "unearth new opportunities for a local craft and [see] how designers can make contributions to the artisan community" (Tung, 2012). Through this study the researchers and students explore the potential of a closer designer-artisan process for designing and making in tandem, leaning heavily on close personal collaboration and shared stakeholder incentives to create novel objects through true teamwork and group study. Through close collaboration, design practitioners and artisan craftspeople become able to exchange tacit knowledge and rapidly develop ideas that simultaneously scale and celebrate a local craft tradition (Tung, 2012).

Although the collaboration between designers and craftspeople is a cornerstone of this research, Tung's paper, like Lin's, provides some insight into what makes a successful relationship between design and craft as schools of thought. Chiefly, whether a deep tacit knowledge (as outlined in the article) or a cursory understanding of the others' expertise, a basic understanding of other stakeholders' capabilities and values creates necessary respect and understanding for the counterparts' contributions to a collaborative product. This likely applies equally to truly collaborative objects like the products in Tung's study or passively collaborative like the hybrid stools in this thesis research.

Both of these studies share a common goal with this thesis' research: the reintroduction of local making advantages into the pervasive global consumption paradigm. For this reason, the problem definition of these articles can also be used to frame the research in this paper because they show the potential of craft inclusion. However, these articles' goals diverge from this research's objectives due to the direction of the change itself. Both of these case studies first showcase the cultural value of existing Taiwanese making culture, second, diagnose the nature of the global market, and third, propose a method for the local crafts to penetrate *upwards* into the larger ecosystem. This strategy may hamstring local craft traditions by requiring them to conform to larger systems and criteria like consistency, timeliness, and even homogeneity that typically only apply to high volume production. In contrast, the hybrid making paradigm outlined in this paper is first a top-down approach where the object is first defined globally then second reinterpreted locally, removing the artisan's responsibility to negotiate the larger global market while still allowing them the affordances of mass-produced components.

2.5.2 Japan: Retaining Authenticity in Production, not in Context

Before World War II Japan's influential philosopher and founding member of the Japan Folk Crafts Museum, Soetsu Yanagi, published an essay titled *Okinawa's Bashofu* (1939) in which he explains how the island's homegrown, handmade, everyday kimono garments were a prototypical example of his concept of *mingei*: the beautiful, humble, natural, and pervasive objects of everyday life. Bashofu are long and flowing kimonos, in Yanagi's time used for daily wear by everyday people, and produced from fine banana tree fibers grown natively on the islands where the fabric is produced. Yanagi remarks that the close link between material, culture, final design and everyday life make this type of object extraordinary:

"It is bought as a mundane item and worn as a part of mundane life. Still, bashofu is beautiful just as it is. Here the idea that what you get is what you pay for does not apply. The cheap is good and beautiful. It is cheap and beautiful because natural conditions made it so" (Yanagi, pp. 102)

Throughout his essay collection Yanagi stresses that, opposed to art, restrictions and guidelines from nature help producers of utilitarian objects reveal the beauty in everyday objects and therefore everyday life.

In his essay, Yanagi describes in detail the making process for this unique banana plant fabric. At each step in the process, he makes connections between that manufacturing step's natural restrictions and the humble beauty of the final kimono. The fabric is decorated with a few standard patterns, all which stem from the nature of the banana tree threads. In the bashofu kimono Yanagi identifies an ideal example of the beauty of everyday things.

Even during the time period described in Yanagi's essay, bashofu production was in decline. World War II's physical destruction on Okinawa and its aftermath's cultural impact changed the course of bashofu production entirely. Beyond physical setbacks following the war, expertise that had slowly been dropping through the years seemed to have almost entirely disappeared. Perhaps even more important was a changing fashion sense that quickly replaced the now "traditional" kimono with western style outfits (Hendricks, 2007). Interestingly, before being entirely unseated by factory-made cotton garments, the traditional bashofu kimono was beginning to be replaced by western-style garments using the traditional material (Hendricks, 2007).

After World War II, Okinawan bashofu production was in such a state that it needed to be actively revived by conscious effort beyond natural social or economic demand. Taira Toshiko (1921-) can be named as the flagbearer for this resurrection (Hendricks, 2007). Toshiko attributes much of her interest in the revival project to Yanagi's original essay. As of 2007, despite some small changes to account for modern market validity and a more standardized product, Bashofu cloth production seems to be at a stable, if not abundant, state.

Although contemporary cloth production is generally alike to the systems of 100 years ago, the market for the end products is different: now, instead of creating affordable kimonos for local Okinawans, most bashofu cloth is sold to tourists in forms such as pillowcases or tablecloths as a keepsake of local, authentic culture. What Bashofu cloth is sold to local Okinawans is usually used during performances or festivals as a costume to represent laborers or common people of the past (Hendricks, 2007). Although contemporary production adheres to Yanagi's criteria for beautiful everyday objects, the use case does not qualify for today's bashofu to be titled *mingei*.

During Yanagi's observations, bashofu kimonos were a prototypical example of mingei because they were a humble, naive expression of daily life in Okinawa: their local cultural context. After World War II, although the production remained consistent, the cultural context had morphed into something that no longer welcomed the bashofu kimono. Production, while physically consistent, was now a product of active conservation rather than a response to natural circumstances. In the decision to maintain authenticity in production was the implicit decision to abandon adherence to contemporary Okinawan culture.

Cultures and their desires, like production methods, are always developing. Occasionally, as Yanagi observed in the bashofu kimonos of his time, a beautiful alignment occurs where the entire chain from plant to garment is aligned within this easy set of natural constraints. This is indeed something Yanagi was right to appreciate, write about, and be thankful for. However to artificially graft the anachronistic production into a new cultural paradigm is ironically against the original intention of the preservation work. To maintain authenticity through physical standardization is reductive. Authenticity and beauty are maintained by embracing new methods, whether cultural or physical.

How does this case study inform the hybrid making approach? The history of the bashofu is one in which local artisan craftsmanship chooses to occupy a niche market in order to preserve its manufacturing system instead of choosing to continue serving the general public by adapting the manufacturing system to the continually changing world of everyday users. Hybrid making, opposite the bashofu supply chain in this way, proposes changes to the local making traditions in order to better serve local community. The authenticity in the hybrid making approach prioritizes local people over local practices.

2.5.3 India: Exploring Different Production Scales in One Supply Chain

In his essay *The Designer and the Socio-Technology of Small Production*, H. Kumar Vyas pulls from a myriad of colonial and post-colonial examples to reveal subtle relationships beneath scales of production, supply chain diversity, and “Third World Economies” that facilitate India’s multi-level production approach (Vyas, 1991). Through historical examples Vyas illustrates the integral role handicrafts and small production have played throughout Indian culture and today in Indian post-colonial industry. Beginning with a summary of his outlook on modern industrial design, Vyas explains the “inseparable” relationship between it and modernist, scaled production techniques. According to Vyas, in North America and Europe this technological development was measured and organic because it has been tied to overall incremental technological progress. However in countries such as India no smooth transition exists; these modern processes have been “superficially grafted” inconsistently and regardless of cultural context. While scaled production is an inherent part of western culture and thus creates a smooth transition, technology transfers to the third world don’t necessarily plug in without issue. Rather these new technologies are tools non-western cultures must adapt to their existing production methods as they see fit, creating a strange mix of very new and very old in an only moderately appropriate cultural context.

Perhaps in response to the grafted nature of new production technologies, India’s post-colonial administration pursued a plan of tandem production from its independence in 1947 (Vyas, 1991). Mechanized mass production would have a role in material extraction and in large quantity staple goods production, two challenges where developing economies have competitive advantage. Communities would at the same time leverage existing small production and handicrafts expertise and the aforementioned abundance of locally produced raw material to reenergize the existing network of small producers. During the independence movement this localized production was reinforced as a symbol of Indian culture: Gandhi “strongly advocated hand-spinning and weaving, and decentralized industrial units” as a modern manifestation of pre-colonial *kalas*, common creators embodying modern ideas of both design and artwork. Relative to large-scale resource extraction enterprises, Vyas mentions small-scale production may require as little as one fifth as much investment per employee.

Vyas argues that when intervening in localized, traditionally caste-based making communities, designers must work in interdisciplinary teams in order to avoid creating heavy-handed distractions by accident. This diverse team must include stakeholder craftsmen, of course, along with experts for challenges such as material procurement and market access. Like Lin and Tung’s studies in Taiwan, Vyas’s perspective on Indian craftsperson aid clearly points towards quality of collaboration as a key indicator for intervention success; despite this focus on collaboration though Vyas also mentions the importance of a planned exit from the system, allowing the stakeholder community to continue in a self-defined direction. It is clear the social systems in India's informal production communities provide at least as much resistance to design intervention as the financial or objective barriers without the outside designer.

At the risk of skipping the integral collaboration step, the hybrid making approach outlined in this thesis may provide one proposal of how to exit the collaboration and independence step and move onto full market viability. Fundamentally different in his approach relative to this research, Vyas describes handicraft and small production paradigms within India as a tool for industrial designers to understand, pushing the definition of design beyond the high-volume mass production and towards his own definition of the designer as a troubleshooter solving unique contextual problems in medium and low scale production environments. And while he well describes the vast differences in scaled production that are possible within a single supply chain, he does not provide any case studies where two scales of production are represented within the same designed product with the exception of off-the-shelf knobs for a low production stovetop. This limits the application of Vyas' research to this experiment, as the design work of the handicraft or small production parts in this thesis are left to the craftspeople themselves. Rather than redefining industrial design to accommodate small scale production like Vyas, this research explores modifying the small production paradigm in order to accommodate traditional industrial design.

Thomas Chambers adds color to Vyas' supply chain summary in his book *Networks, Labour and Migration among Indian Muslim Artisans (2020).* Specifically through observation and community engagement, Chambers succinctly diagrams the relationship between larger wholesalers and the complicated, fragile network of small crafts producers in gullies and factories alike. Standing opposed to the western and comparatively individualistic local production paradigm, where each studio is branded and with an internet presence, Chambers describes a neighborhood-factory hybrid space where labor is so clearly divided by trade that even small operations like sanding or finishing might be segregated to different businesses across a neighborhood. Because of this organization, design work can be so democratized that it happens organically without explicit standards or formalized top-down narrative direction. Across the gully supply chain, 81 percent of workshops receive outsourced work; of this 81 percent, 52 percent further outsourced work themselves (Chambers T., 2020). Chambers describes the wholesaler as the big fish, selling the wood to a carver (typically on credit) who then outsources specific operations to painters, inlayers, buffers, finishers, and showrooms - often employing rickshaws to transport materials between all these small operations. Between all these players are deep social relationships, informal partnerships, and a tangle of debts, late payments, and forwarded payments creating financial binds for all system members. The businesses are independent because they each represent themselves, but all are still tied together financially just like branches of a single corporate structure.

2.6 Hybrid Objects in Turkish Context

Industrial Design in Turkey is a top-down methodology applied to a bottom-up making paradigm. Always on the periphery of the west, Turkish industrial design's relationship with traditional Anatolian small and medium manufacturing is characteristically unique while simultaneously showing similarities with its geographical and cultural neighbors. Around the time of introduction into Turkish culture and economy, industrial design as a profession was seen by the west as a way to add value to products beyond utility through styling and usability for broad audiences at scale (Pilditch & Scott, 1965). In fact industrial design as a professional practice may itself be described as, like the new western technologies described by Vyas, a grafted-on western product that the home culture must adapt to its own cultural context. This bizarre mismatch between modernist, western-oriented ID practice and native traditional systems of production has created tension between the Turkish industrial design community and the adjacent business, manufacturing, and engineering professions, with these conflicting and paradoxical relationships even saturating Design's relationship with the general public (Ilhan & Er, 2016) (Er, Korkut & Er, 2003). For this reason Turkish ID's relationship within its own cultural context remains fickle and ill-defined. The first three Turkish industrial design programs began in 1971, 1979, and 1985, before the Turkish economy had created significant demand for the profession (Balcıoğlu & Emgin, 2014) (Ilhan & Er, 2016). However initial endeavors to implement industrial design as a western political tool started as early as the mid-1950s and continued throughout the 1960s by the United States during a particularly consolidated, modernist and corporate chapter even for American ID (Er, Korkut & Er, 2003).

This transplanted origin story creates the roots for the ongoing dissonance between a western, modernist, standardized, technology-driven ID approach and a traditional Anatolian making paradigm that better mimics Chambers' description of the gullies of Saharanpur than the top-down, scaled production paradigm common in ID's European or American location of origin. This dissonance creates inefficiencies in the Turkish industrial design environment and may even foster resentment between the two making approaches as they inhabit the typically unique Turkish making environment and show opportunity for the hybrid making approach. Currently a clear lack of "technical know-how regarding production techniques, mechanical design, and materials" limits ID's ability to interface with engineers or producers with efficiency or reliability, creating several instances where factories or firms who previously worked with "incompetent" industrial designers become at least skeptical of the profession's ability to contribute to a system that works without them or at worst unwilling to work with industrial designers at all (Ilhan & Er, 2016, p.28).

The American industrial designer David K. Munro, tasked with beginning the industrial design department at METU by the American government during the cold war, clearly demonstrates the contextual importance of understanding culturally and contextually appropriate objects:

"Industrial Design, at its best, is an important social factor. It is, moreover, a critical capitalistic tool. It does not really exist for aesthetic and altruistic reasons per se. When lagging industries approached Raymond Loewy, Norman Bel Geddes, and Henry Dreyfuss in the U.S.A. in the late 20s it was because these industries felt that they needed some sort of a competitive advantage at the marketplace - the point of sale. The mere transposition of Industrial Design disciplines and attitudes from more advanced economies and technocracies, to Turkey for instance, would be invalid." (Munro, 1971)

METU ID department's establishment would be delayed until 1979, 7 years after Munro's departure from Ankara, due to anti-American sentiments and protests among students (Er, Korkut & Er, 2003). Ironically this excerpt clearly demonstrates, along with his focus on design as a capitalist tool, the importance that ID becomes a culturally contextual, culturally specific practice in developing countries in order to provide value and permanently succeed. Transplanting modernist ID ideology into a circumstance with different business practices, user behavior, government policy, and manufacturing capabilities provides little social or financial benefit.

In the 1997 article titled *Development Patterns of Industrial Design in the Third World: A Conceptual Model for Newly Industrialized Countries*, H. Alpay Er analyzes the progress of industrial design as a professional practice in "Newly Industrialized Countries" (NICs). Of the total group of developing countries where industrial design had been introduced after World War II, the ones that were able to graduate to NIC status showed common patterns of a sound and predictable governmental policy and a competitive incentive for innovation and differentiation via a large export market (Er, 1997). Domestic markets typically followed in ability to support ID. Industrial capabilities of NICs, while a necessary ingredient, were not a primary differentiator between NICs with and without flourishing industrial design activities (Er, 1997). At face value this finding may contradict Munro's opinion that local contextualization is required for ID to flourish in developing economies because it shows that ID success requires industrialization, exportation, significant capital, and competition in realms of taste rather than utility. However this paper's

ID-centric perspective in fact confirms Munro's opinion. In this paper, Er looks to identify the commonalities between environments in which modernist, westernized ID can succeed, which of course mimic western markets themselves. The criteria allow no room for alternate definitions of industrial design beyond the westernist modernist flavor that is disadvantaged in emerging markets for the same reasons that it flourishes in western, industrialized cultures.

Thankfully the incongruence between modernist-oriented ID education and pre-WWII Turkish production paradigms has been explored by design researchers and a handful of paths forward from the current climate show promise. As a first approach to cataloging the role of industrial design in Turkey, Tevfik Balcıoğlu and Bahar Emgin summarize recent attempts to contextualize Turkish design within the boundaries of typical western Industrial Design practice in their article *Recent Turkish Design Innovations: A Quest for Identity* (2014). Central to this narrative is the 1995 customs union between Turkey and the European Union, which opened export markets and gave Turkey's abundance of modernist-leaning industrial design professionals their first opportunity to provide products to a user group with equally modernist taste (Balcıoğlu & Emgin, 2014). Through this incoming demand Turkish design received an opportunity to define itself as simultaneously modernist (in its ID background and target market) while positioning these modern products as developments of traditionally Turkish motifs and use cases.

During this time, the Turkish design community saw these motifs and use cases as an opportunity to fight the homogeneity of the global industrial design market by creating an authentic, commercially attractive origin narrative (Balcıoğlu & Emgin, 2014). However despite deep formal interpretation, Balcıoğlu and Emgin make no mention in their article of any manufacturing-driven differentiations. If this is consistent with a lack of such initiatives in Turkish ID history, despite sincere demand developing domestically and abroad for culturally rich, specifically Turkish ID products, it feels reasonable that forms initially chosen in pre-industrial Anatolia for their pragmatic manufacturability and use cases cannot efficiently compete against new forms pragmatically defined as modernist and chosen so they could be easily fabricated at industrial scale. A quote borrowed from Balcıoğlu and Emgin, as Jonathan Friedman argues, “the objectification of culture is one of [globalization’s] instrumental aspects - the reduction of the practice of difference, of meaning, to a product, a text, a substance which liquefied can thence flow across all conceivable borders.” (Friedman, 2006. p.404). Applying a heritage by borrowing shapes, patterns, and colors while neglecting changes in manufacturability or usability inevitably leads to non-competitive products.

Harun Kaygan’s article *Material Semiotics of Form Giving: The Case of the Electric Turkish Coffee Pot* (2016) presents a clear explanation of the new criteria that must be addressed when adapting a traditional form for a new product iteration in the modern mass-manufacture market. In this entry Kaygan documents the product development of the first electric Turkish coffee pots from design through production. Initially starting with the brief from the primary manufacturing companies to the independent design houses tasked with the concept development, Kaygan documents how each designer felt a responsibility to incorporate the traditional curve typical to the analog version of these products. Indeed one designer interviewed by Kaygan mentions that of three concepts presented to the client, two had the “Turkish style” of curvaceous design while one had a “heavily German style” with a straight cylindrical form as a Plan B (Kaygan, 2016, p.80).[1] Along with cultural representative and ritualistic importance, the curve also had objective benefits for the making of Turkish coffee (Kaygan, 2016).

In this product development cycle, as the traditional form butted heads with the contemporary mass-manufacturing paradigm, new modernist justifications were required to ensure the curve would be a part of the final product. Kaygan categorizes these justifications as such, separated by stakeholder:

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[1] The straight-walled “German” style may appear as such because it is appropriate for mass production.

- Designers: employing tradition
- Coffee: making quality, frothy Turkish coffee
- Executives: protection against copyright infringement
- Marketers: competitive advantages through product differentiation
- Users: using the pot as if it were a traditional pot

Kaygan's interviews make clear that "the most significant drawback of reproducing the curve was in its manufacturing… requiring a complex metal spinning process, resulting in high costs and inconsistent quality" (Kaygan, 2016. p.86). This inefficiency was pitched by designers to executives as a prestigious product differentiator. Although the curve of the traditional Turkish coffee pot was clearly adapted by the electric equivalent and has now become a staple of the electric coffee pot market, this was only possible by changing the justification of the curve to satisfy each stakeholder's unique incentives. Such muddying of a cultural feature's importance is risky. It is possible that, despite being more semantically foreign for Turkish users, the "German style" coffee maker as described above may have been a more appropriate choice simply due to its honest adaptation of an ancient use case to a modern manufacturing landscape.

This case study of the Turkish electric coffee pot documents a fascinating process through which a culturally specific and symbolic consumer product is adapted for the making traditions of other cultures, mass-manufacturing. It is possible the coffee is as much a product of the traditional coffee maker as the coffee maker is a product of the coffee drink. The laborious process of matching the object with the way it must be made to serve scaled production may not have been necessary had a hybrid approach, or at least one similar to Vyas' Indian perspective, been employed. While traditional industrial design is well equipped to manage limitations of mass manufacture, these limitations may be unnecessary.

More naturally and as a second approach to unifying Turkish tradition with its industrial designers, closer coordination with producers may provide industry development beyond the current role of industrial design in the Turkish economic system. In their exploration of Istanbul's craft neighborhood clusters, Çiğdem Kaya and Burcu Yağız propose a modification of the role of design to better leverage existing craft paradigms as a way out of the current conundrum (Kaya & Yağız, 2011). In this research Kaya and Yağız propose a close collaboration in which industrial designers forgo their top-down, making-of-multiples education in order to focus on deeper, subjective collaboration with local craft masters. Through interviews with designer/master tandems the authors highlight empathetic discussion, informal idea sharing tools such as paper sketches, bottom-up design processes where the final objects' details are not defined until primary operations are completed, and a mutual understanding and respect for one's partner's expertise. This certainly expedites the form-giving process for simpler products, standing in stark contrast to standard industrial design top-down processes employed in Turkey and elsewhere (Kaygan, 2016).

While high quality products are created often through these systems, the designer and master in this tandem approach must each sacrifice some level of their traditional background in order to succeed. There is clear benefit (perhaps requirement) for successful duos to share a friendship beyond the financial benefits of working together (Kaya & Yağız, 2011). This social foundation requires, at least to some degree, a shared culture or background; this means that unlike the hybrid making approach the design representative and the production representative must share some facet of their culture in order to successfully collaborate in this way. The two stakeholders must be aligned in their purpose and their non-financial production incentives.

The research experiment outlined in this thesis may provide another way to address the dissonance between Turkish ID and traditional making communities. Though through all cultures and case studies the researchers have emphasized the importance of collaboration between designer and local maker, the reasons for this collaboration typically concern respect for or understanding of the capabilities and expertise of the other party. By including Design's role in responsibilities of the artisan, the designer can be removed from the local making environment and render collaboration unnecessary.

CHAPTER 3

METHODOLOGY

The researcher followed a research through design (RtD) approach. The methodology was chosen for the reasons outlined in this chapter.

3.1 The Research Through Design Approach

In his 1993 essay titled *Research in Art and Design*, Christopher Frayling unpacks relationships between knowledge gathering, and perhaps more importantly the validity of the results, in the art, design, and scientific research communities. Two decades later this essay would be historically contextualized as the foundational validation for research through design, framed against research *into* or *for* design (Frayling, 1993) (Stappers & Giaccardi, 2018). Archer (1995) also contributed to the discussion at that time on how design practice could be utilized as medium for research inquiry, developing his own interpretations of research into/for/through design.

Foundationally, Research-through-Design (RtD) literature posits that knowledge acquisition is an essential part to design practice whether or not it is academic - and that this knowledge acquisition strategy, when properly documented, can be an effective mechanism with which to generate new knowledge. The difference between design practice knowledge acquisition and RtD is that while traditional design practice is meant to conclude with a true product, RtD processes typically end with a prototype or research object. Furthermore, whereas in practice the value of the research beyond what is manifested in the final product is null, the value of the research in RtD methodologies is within the process itself as much as it is manifested in the research product produced by the research journey.

The research executed in this thesis work naturally lends itself to the RtD methodology because it is meant to examine the validity of a new design and making approach, hybrid making. The RtD process executed in this research creates prototypes to empirically test a hypothesis: to quote Elisa Giaccardi, one common circumstance in which RtD is employed is to "use artifacts as instruments for data collection in experimental or quasi-experimental empirical evaluations" (Giaccardi, 2019, p.141). In order to determine validity the hybrid making process must be executed, by the researcher, volunteers, or in this case both groups, with a discerning and critical eye at each step. The benefits of this process insofar that they apply to this research are mainly that findings can be directly tagged with the part of the product development journey where they were discovered. The challenges and benefits of the hybrid making paradigm overall can be cataloged as they are seen in the final submitted objects and interviews, but also can be pinpointed as a symptom of a certain chapter in the making process.

In broader terms, because the concept under investigation is so novel, a broad and loose (though critical) approach was required in order to allow the researcher enough agency to make changes to future research steps as the process was executed. Insights gleaned in each phase of the research plan were essential to determining the details of future steps. Outside of the RTD methodology it would have been challenging to justify this strategy. Ultimately, because the primary aim of the research was to determine if there is any validity in the hybrid object making paradigm, the researcher was justified in taking every step possible to achieve the most valid objects: this includes modifying future phases based on new data. The methodology and creation journey are documented with such commentary.

To clarify terms, *prototype* is typically used for artifacts created in this methodology (Stappers & Giaccardi, 2018). Odom et. al propose that the term *research product* be used instead because it references the potential of real utility in the artifact (Odom et al., 2016). In this project a real product will be defined as anything valid outside of a research context.

What is the appropriate term for the hybrid-made stools in this RtD process? During the design of the seat pan the component is a true prototype because it A) is meant to stand in for something similar, and B) is created in order to produce knowledge that is not necessarily embodied in its final material form - the knowledge *may* be, but may also live only in the process documentation. However, this demarcation changes once the component is distributed to the makers: for the makers the seat pan only possesses the knowledge from the previous RtD process that is directly instilled within the part, making it a true object. Once given to the makers the seat pan component no longer represents the whole of the knowledge acquired in its supporting design process, it only represents the knowledge that is directly instilled in itself. Each maker's submitted stool utilizes the seat pan plainly as a component: as a tool with which to reach the most ideal final product. This framing of the seat pan when presenting the project to makers was essential because at that point, the seat pan was to represent a top-down, distributed object over which the local maker had no control before it was in their possession. The matter-of-factness of real products carries this stubbornness naturally.

If the seat pans are both prototypes and real products, are the stool submissions prototypes, research objects, or real products as well? It is the opinion of the researcher that the final deliverables are, to use Odom et. al's term, research products. Relative to the typical RtD prototype the stools are valid in that they fulfill their utility and are valid in that their makers were tasked to create real products. It may also be worth mentioning that the stools' inherent nature as one-off products reduces their association with the term *prototype* inside or outside of RtD. On the contrary, relative to *actual* real products, the design and development experiences of the makers are equally valid knowledge acquisition and are thus included in the analysis of the objects. The balance point is, as Odom describes, "predicated on what it is as supposed to what it might become" (p.2550) but is still certainly a vehicle with valid procedural insight.

3.2 Methodology Summary

The methodology behind this research followed the hypothetical in-industry product development journey of a hybrid object, with different research participants representing different stakeholders along the path to market. This system afforded the researcher the ability to diagnose opportunities and challenges at each step along the hypothetical product development timeline as objects could be analyzed at each step of the process. The resulting data was therefore easier to draw insight from because there were sedimentary layers of documentation from each phase. This section explains the journey and decisions behind the methodological strategy while occasionally offering reflection on the process itself.

First the vehicle object was determined (Chapter 4.2.1). A stool was chosen as the vehicle object because it is commonplace and easy to understand, can be made from many materials with diverse production methods, and can be assessed both technically and subjectively. Choosing the vehicle object required abundant secondary research, and criteria for success (outlined in Chapter 4.1) combine ideal conditions with research limitations. Second, the researcher, a professional industrial designer, created the mass-manufactured component concept of this vehicle object based on real industry constraints and best practices for scaled production (Chapter 4.2.2). This process developed over approximately 10 weeks. The aim of the final object was to appear real to the artisans and, as typical to a RtD process, reveal insights about what hybrid making may produce as a distributed component. Appropriate manufacturing methods and materials were specified based on existing mass-market versions of the hybrid object. Third, these "mass-produced" component prototypes were fabricated in such a way that they would be as indistinguishable as possible from truly mass-manufactured parts (Chapters 4.3.3 & 4.3.4). Discrepancies between a true mass-produced version and the existing prototype components were included. Overseas production and shipping cost several weeks. Fourth, these components were distributed to Anatolian artisans in order for them to each complete the total vehicle object to their own design and specification (Chapter 4.3). Each artisan received two short documents: the first briefly explained the project and their role within it, whereas the second diagrammed and identified the connection methods on the bottom of the mass-produced component. Artisans were found through a variety of channels outlined in detail in Chapter 4.3. Fifth, the artisans completed their objects, and the finished objects were returned to and analyzed by the researcher (Chapters 5.1 and 5.3). The researcher analyzed the objects based on standard design and workmanship criteria, as well as a few supplementary terms directly related to the risks and opportunities of the hybrid making paradigm. Finally the researcher administered a short questionnaire and discussion survey in order to understand the artisans' opinions on the objects and the hybrid making process itself (Chapters 5.2 and 5.3). These justifications and concerns were incorporated into individual stool reviews as well as overarching graphical analysis (Chapters 5.4 and 6.1). The research was executed, in total, over approximately seven months.

The hybrid stool's seat pan was designed by Max Plummer, the graduate student conducting this research and an industrial designer by trade. Max has held full-time junior and senior industrial design positions and holds a degree in industrial design. Whether good or bad at his job, Max is qualified to call himself an industrial designer and therefore qualified to represent the industrial design paradigm within this research project.

The researcher applied for and received ethical clearance for this study from Middle East Technical University (Appendix T), and all artisans contributed to the research through informed consent.

CHAPTER 4

CREATION OF HYBRID OBJECTS

Chapter 4 documents the RtD journey taken by the research team as it conceived, designed, created, produced, and distributed the seat pan component. Also included is the recorded experience of courting each artisan participant.

4.1 Choosing the Vehicle Object

Choosing the vehicle object was deeply connected with what characteristics would ultimately be assessed within the final objects, meaning the assessment criteria would be required for vehicle object definition. These objects must exhibit the qualities this research project hopes to measure but cannot be prescriptive or provocative in a certain direction beyond what's defined by the distributed component. Below is a defined set of characteristics that must be present in an effective vehicle object:

1. *The vehicle object must have value propositions that exist in both mass manufacturing and local making.*

   Each making paradigm must be given an appropriate jurisdiction within the hybrid vehicle object, based on each paradigm's characteristics defined in Chapter 2.4.1. For example, a teacup or vase may be unbalanced because it favors the expertise of the craft making traditions and neglects the opportunities afforded exclusively by industrial design. On the contrary, a computer or microwave may be an unfit choice because it favors the capabilities of scaled production over local making. Examples of balanced vehicle objects may be a coffee dripper, a flashlight, or a piece of furniture, which all include components that represent each paradigm's strengths.

Because the scope of this research only hopes to provide insight where hybrid objects may be an economically valid approach, dismissing objects on either end of the spectrum as unrealistic to benefit is a sound methodological approach. Object types walking the line of valid/invalid for this kind of research are also out of the scope, as the goal of this project is to give a hybrid object the best chance to show opportunity in order to disprove the null hypothesis that hybrid objects show no potential. Applications of this process can be considered in future research if this initial study's output shows promise.

2. *The vehicle object must be familiar, simple, and commonplace.*

Clear object recognition will afford researchers a clear assessment of defined, isolated variables without requiring an understanding of an obscure or invented use case or product. Furthermore the simplicity of a well-chosen vehicle object will allow researchers and participants to quickly focus on the object features relevant to the key research questions without getting bogged down or distracted by other details.

A commonplace vehicle object's validity, when completed, will also be measurable against specific other objects of the same type as well as the collective of the object type. For instance, a light bulb is a commonplace object that does not require analysis against another specific light bulb: it is easy for non-experts to judge a specific light bulb against the general idea of other light bulbs or light emitting objects.

3. *the vehicle object must have both utility-driven and narrative-driven features.*

   The duality of purpose ensures both paradigms will be granted jurisdiction over certain object features. The highest quality objects of the vehicle object's object type already must achieve some level of expertise in both metrics. Ideally, a vehicle object's surfaces or components are split along these paradigm-appropriate lines; if so, the object will be easy to divide, create, and assess. This division will be determined by the researcher.

4. *The vehicle object's utility-driven and narrative-driven features must be formal.*

   Each feature in the object must be exposed to users, meaning there will be no "B" side where ugly features can be hidden. The plain physicality of the object, and the direct relationship between the object's form and its utility, will make it clear how to use it and what is going wrong if it doesn't work. A formal, material-driven object utility will also make object assessment simpler and research insights easier to share through visual documentation.

5. *The vehicle object must be made from a materials with application in both making paradigms*

   The vehicle must be at home in a material group that has several applications and associated fabrication methods in both mass manufacturing and local making paradigms. This duality will make it a known, recognizable material family for experts of both traditions, allowing for deep and applicable contributions from all creators involved.

A task stool was chosen as the vehicle object based on these criteria:

1. *A task stool has value propositions in both paradigms.*

   Any seating object has clear utility, but within this broad category there is a wide variety of unique utilities offered: office chairs afford extended comfort, couches are great for relaxing, bus stop seats are weather resistant, and so on and so forth. Stools, specifically, are a simpler and more versatile cousin to these standard seating object types. Usually a little less prescriptive in their use, a good stool is durable, trustworthy, aesthetically rich, portable, and handy.

   Some stools are great to stand on, some can be stacked or stored, some are permanently cast in place and others are collapsible. However, all stools have a humble recognition that a little comfort is sometimes worth sacrificing for the convenience of any of these supplementary capabilities. This down-to-earthness of the stool, or maybe its recognition of the importance of its surroundings, fits nicely into this research - the importance of the stool, like the importance of this thesis, is a response to unideal or ever-changing contexts, and the recognition that a one-size-fits-all approach to design or production, or seating objects, is sometimes a one-size-fits-none.

2. *A task stool is familiar, simple, and commonplace.*

   All participants in this research process have innate understanding of stools and experience with good and bad ones. This understanding of the object will make assessment and development simpler. Furthermore, a specific required knowledge is not necessary for valid analysis, meaning the vehicle object stools can be compared and contrasted with no design or manufacturing expertise.

3. *A task stool has utility-driven and narrative-driven qualities.*

Stools divide simply into two parts (or collections of parts), each pairing nicely with an existing making paradigm by granting opportunities for its respective value propositions. The top of a stool, which this research defines as the seat pan, is a mathematically defined surface with clear ergonomic requirements and utilitarian qualities that affect people equally regardless of their social, cultural, and economic background. Meanwhile, the base of a stool comparatively invites much more opportunity for play, expression, and individuality without requiring too much attention towards utility.

Because the commercial furniture market already includes large and small businesses, some inferences can be made about how this research's task stool may divide between the mass manufacturing and craft making paradigms. When looking at the market it is clear that larger companies like Steelcase or Herman Miller generally focus on high performance seating objects, typically for office environments. First, this strategy is possible because objectively comfortable office seats have enormous user groups: in the work environment personal taste is more quickly dismissed for objective benefit. Simply put, there are more people to sell these objects to because homogenous designs are widely attractive. Second, the distancing of these objects from fashion or style means they can stay on the market for a long time, further increasing scale and incentivizing deep R&D investment. Third, based on this R&D potential, these high-volume objects' utilities are improved with access to mass production strategies, thus perpetuating the cycle of scale. The scale potential of these products is all afforded by the ergonomic comfort of the seating object, behind which all other values are deprioritized.

On the other end of the spectrum, a plethora of small design houses or individual furniture makers are capable of creating seating objects that are adored - at least, more than an office chair. The hand-crafted nature of a Nakashima or Sam Maloof is more socially attractive than the plastics on the high-volume products, giving these objects a richer understanding of object value beyond comfort or utility. However, these objects are only found in culturally considered contexts. With this strata in mind, this research's task stool will be divided so that the seat pan surface (i.e. the object's ergonomic requirement) is defined by industrial design, while all other features are defined by craftspeople.

4. *A task stool's features are formal.*

   There are no electronics and usually not even dynamic parts on a stool, and the primary utility features are entirely supported by form and material. This will make assessment criteria apparent to researchers and participants.

5. *A task stool's utilitarian-driven and narrative-driven components can be made with a variety of appropriate paradigm-specific materials.*

   For both the industrial designed, mass manufactured seat pan, and the craftsperson-made base, a variety of appropriate making methods and materials are available. The seat pan's complex shape lends itself well to traditionally mass-produced materials and methods such as injection molding or perhaps technical weaving, whereas a stool's legs can be made from wood, metal, ceramic, and perhaps even glass or textile. The materials and methods each part affords gives their respective creators a wide range of familiar possibilities to explore within their expertise. Plus, based on feasibility, including a variety of craft traditions may increase the number of stools available for assessment.

4.2 Designing the Seat Pan

While the locally crafted parts of these hybrid stools are authentically made within the same systems, constraints, and motives as they would be outside the research project, the seat pan, which represents industrial design and mass manufacturing, is not genuine in the same way. Due to the small production run and capital constraints, it was not feasible to launch this half of the hybrid object in a true fashion; rather, a similar set of systems, constraints, and motives was used to mimic the real ID and mass production process. This proxy process was executed by the researcher and is cataloged here in an RtD approach.

The designer feels this is important to note because while the craft making processes in this research methodology are inherently true, meaning whatever comes of those processes is sincere, the ID and mass-manufacturing parts do not enjoy that inherent tenability. Unlike the research with the craftspeople, true stakeholders would not be interviewed about their experience with this research and it will be impossible to learn if they would be inclined to adopt this approach as part of a business venture. Instead, while executing the proxy process, it was essential the researcher (acting as an industrial designer) acted in good spirit and justified their actions based on the imagined incentives of a for-profit design consultancy or seating company. The effectiveness of this RtD approach is discussed in Chapter 6.2.

4.2.1 Underlying Values in Seat Pan Design

Due to the above inauthenticity concerns, the researcher kept in mind the benefits of the ID/mass production paradigm as opposed to the locally crafted alternative at each crossroads in the seat pan development process. With this as a key decision-making aid it became simpler to lean on the benefits of ID & mass manufacturing and insure the final seat pan object would represent its paradigm effectively. With this motivation in mind the seat pan's design and engineering possess the following driving features:

1. The seat pan form is easily manufacturable using common mass manufacturing methods. Designed to be injection molded from a two-part mold, the design features no undercuts (save for the cosmetic "2022" debossment) and generally consistent wall thicknesses. The only notable exception is the thickened seat pan, which would not be a feature of a true injection molded part) and is added in the research object to ensure utility.

2. The seat pan's form is ergonomically defined based on objective user research. In the literature review the researcher defined mass manufacturing and industrial design methods, as supposed to local artisan design and making methods, to be much more objective and repeatable - this strength is capitalized upon by designing with objective ergonomics data that remains true independent of cultural context.

3. The seat pan's top surface is parametrically defined, making modification and iteration simple. The quick iteration afforded by simple tweaks to the inputs of these parameters made it possible to create and analyze several similar forms in rapid succession. It should be noted that while this remains a feature of industrial design more so than local making, cartesian manufacturing methods (i.e. CNC, 3d printing, et cetera), a growing local artisan base, and more intuitive programs have made these tools more accessible at all scales (Aitamurto, Holland, & Hussain, 2015).

4. The seat pan's underside connection points leverage high precision and repeatability to interface with common standard hardware components. As mentioned in the literature review, mass-manufactured processes enjoy a high degree of control over surfaces' relationships with each other - even if

they are driven by different rules within the piece. This benefit made compliance with standard hardware seamless.

5. The seat pan's material is common in mass manufacturing. Using an ABS-like polyurethane material that mimics ABS performance in this prototype showcases the manufacturing options made possible by mass manufacturing methods. Clear parts, consistent surface finishes, and symmetry between swept forms are easier to produce within this large-scale paradigm and displayed here as possibilities and celebrations of what mass production can uniquely afford.

4.2.2 Clarifying Seat Pan Design Criteria

At the beginning of the design process the seat pan was determined to be a tractor-style seat. A few key characteristics informed this approach: tractor-style seats are easily mass-manufacturable without synthetic foams or fabrics that would break down in UV-intense or wet environments, and do not require a seat back like a chair. Furthermore tractor-style seats are meant to be used in utilitarian contexts for several hours at a time, matching the general application of standard stools around the house (minus maybe using them as footstools, which is squarely outside the utility expectations for this specific object). Third, tractor seats strike a nice balance between prescriptive and free use, as they are sympathetic enough for a specific use case but not so much that a user couldn't move around or find multiple comfortable positions while using the object. Tractor-style seats are also single body parts and easy to connect other parts to.

Purchasing overseas-made, mass-manufactured tractor seats already on the market was briefly considered. The benefits of this decision would be that the seat pan objects possessed the same inherent truthfulness as the craft-made objects, and that whatever hybrid objects manifested from the project would ultimately be "authentic". However, while this path does *somewhat* fulfill the primary research goal, a few disadvantages disqualified the approach. First, a lack of control over the mass-manufactured seat pan's design is an enormous sacrifice: as the goal of this research project is to examine the validity of hybrid objects, the designer considered it essential to give every opportunity possible to local makers to complete objects with true value. Second, purchasing off-the-shelf mass-manufactured components is already standard in local craftsmanship in the form of screws, glazes, electronic components, and so on and so forth. Third, the researcher deemed it integral that the mass manufactured part was designed with collaboration with local crafts processes in mind - this research project is not about examining the plausibility of retrofitted mass-produced parts, rather, it is about examining the possibilities that are revealed when a mass-produced part that is sympathetic to the needs of local makers is offered in community contexts. Fourth and most importantly, the insights gained through the RtD approach are as integral to the final takeaways as the artisan submissions. See Figure 4.1, a mass-produced tractor style seat available online.

Figure 4.1. Vintage steel tractor seat universal seats TC4501[2]. Qingdao Yi Heng Special Hand Truck Co., Ltd. MOQ 100 pcs @$7.00, >=5,000pcs @$3.00

The tractor-style seat paradigm consists mainly of a deep swept supporting surface with consistent thickness (original sheet metal tractor seats are die cast or stamped) and attachment features on the bottom (generally welded on or stamped in). The deep recession allows the back lip to partially support the lower back, allowing a more comfortable long-term sit while still not requiring a true seat back.

[2] https://www.alibaba.com/product-detail/Vintage-steel-tractor-seat-universal-seats_60212914128.html?spm=a2700.galleryofferlist.normal_offer.d_image.4e2e3578mDggZO

True to the paradigm, the designer aimed to create a comfortable utility surface on the top face of the seat pan while providing ample opportunity for local makers to attach their components to the base of the object without hassle. In order to honor the pragmatism of the original object, these features would need to be added with no extra manufacturing steps (the ergonomic features and connection features in the above tractor seat are formed simultaneously in the stamping process). While two-part seat pans were briefly considered (a stamped top face with a plastic connection base), these concepts were dismissed because they did not fulfill this simplicity criteria as effectively as a single body part. Injection molded plastic was chosen over stamped metal because it could easily execute both the top and bottom forms simultaneously.

Regarding material selection it was clear from the beginning of the design process that this part would be some sort of plastic. Keeping in line with the benefits of mass manufacture, plastic’s durability, formability, lightweightness, color/clearness options, and affordability showed it was clearly the most appropriate option. Furthermore, injection molding reduces secondary finishing operations and the likelihood of needing multiple parts.

4.2.2.1 Revision A

Figure 4.2. Seat pan, Rev A

Rev A began with a simple heuristic understanding of the tractor-style seat surfacing and was intended to be a basic familiarization model for understanding the true surfacing mathematics behind the seating style. Rev A uses a swept semi-circle lofted surface in the back, with two symmetrical swept profiles in the front edges. While Rev B uses a similar logic, the reflections and renders made it clear this was only approaching the correct parameters and not truly parametrically efficient. Rev A also made no effort to define the connection methods on the bottom of the object.

More loosely, the insights gained from Rev A were typical of a first draft project - how big the object needs to be, where the most important driving parameters are, and generally some previously unknown benefits of the design (i.e. rigidity from the outer fold) were all revealed by this exercise. The bump in between the thigh rests was mathematically and ergonomically frustrating and ultimately was removed after this attempt to stay true to the tractor seat paradigm, a potential sacrifice incentivized by the mass-manufacturing approach relative to something more analog. Rev. A's research through design was also a sort of secondary research because it helped reveal the logic and justification behind features on existing tractor-style seats.

4.2.2.2 Revision B

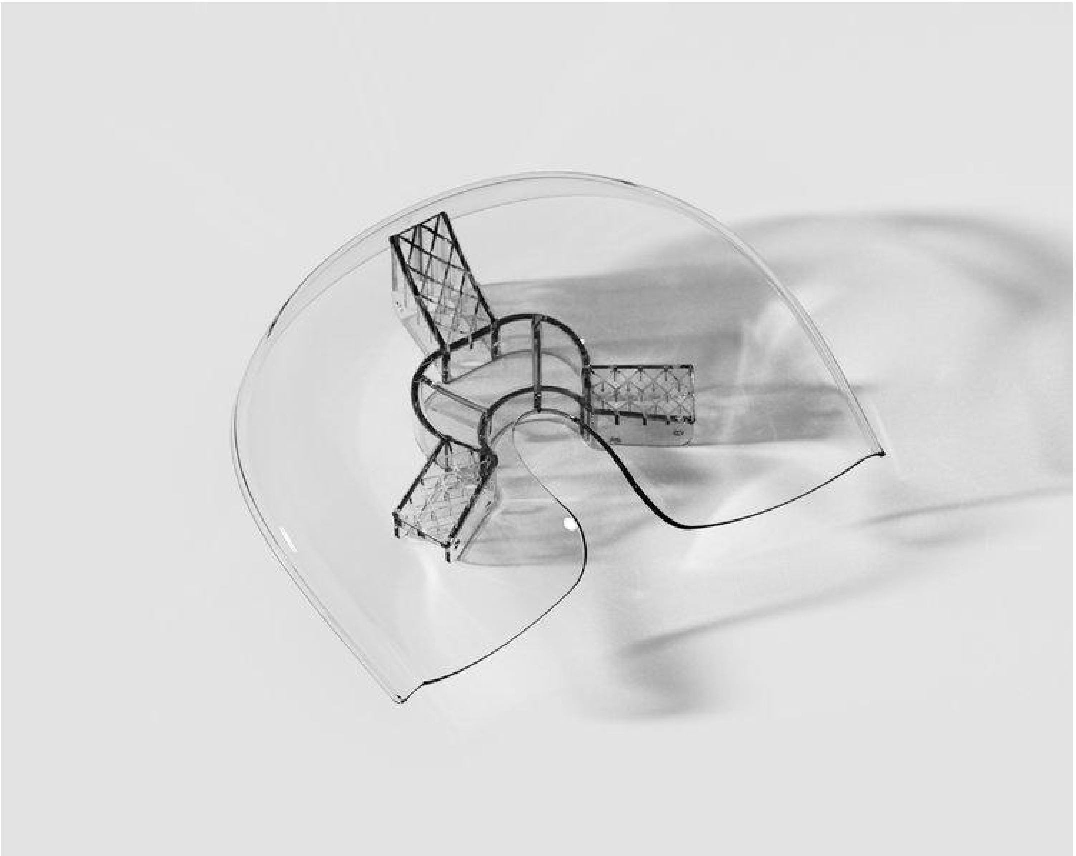

Figure 4.3. Seat pan, Rev B

Rev B pushed the base construction of Rev A to its limits and made apparent to the designer that the three-sweep system (one loft in the back and two symmetrical thigh sweeps) was incorrect. Instead, Rev B uses a single loft with five profiles - one on each front edge, one at the intersection of the vertical plane halfway deep into the object, and one at the back bisecting the form. Rev B also proposed the first horseshoe cut-out on the top surface and was the first iteration to explore what the connection feature set may look like.

The only feature in Rev B that helps craftspeople add more parts to this object is the three placement areas for wood or metal legs, however, that development was an important first step in laying out how the bottom of this object may be manifested. The inclusion of as many extra features as possible on the bottom of the seat pan, though without adding manufacturing complexity, was a goal for the researcher. The gridded support structures for the extra components as well as the supporting structure itself are all created along the same molding axis as the seat pan itself, meaning that nothing but a higher tooling cost would affect the manufacturability of this new affordance. At this time the designer was still primarily focused on figuring out which rules to use to define a tractor-style seating surface more so than the ergonomic proportions that would ultimately be the product of those rules.

4.2.2.3 Revision C

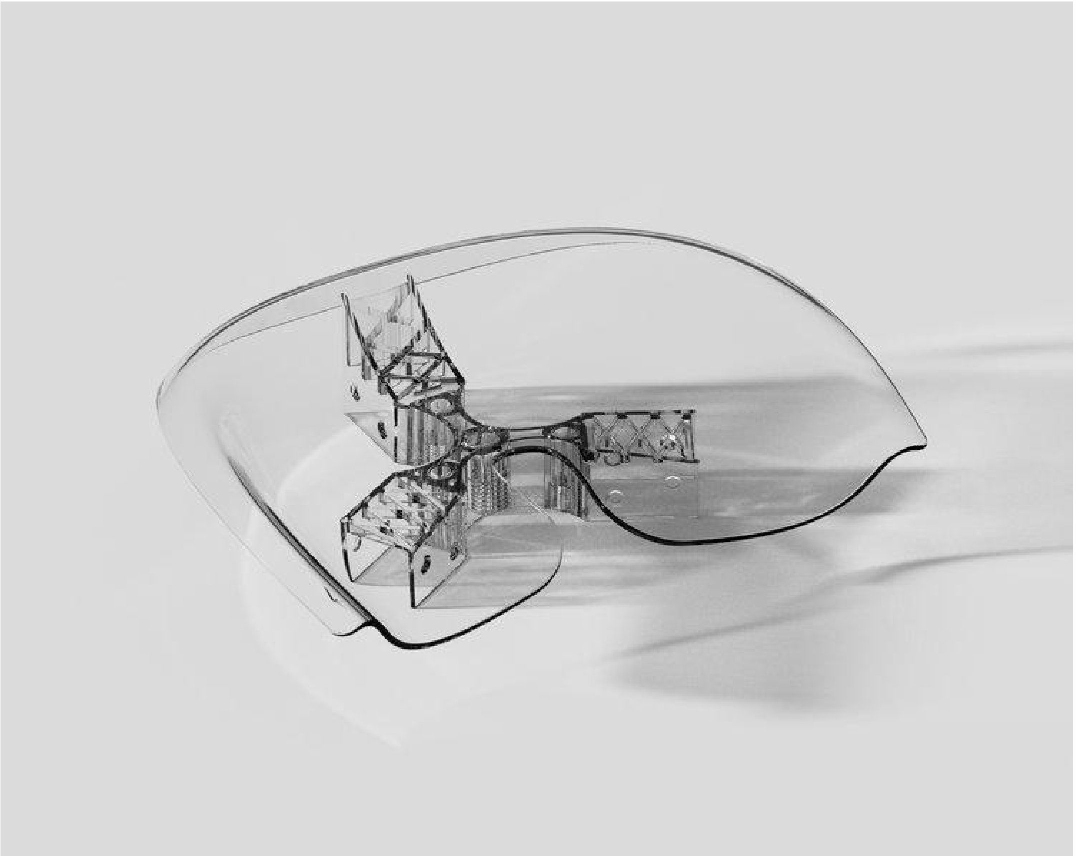

Figure 4.4. Seat pan, Rev C

Rev C proposed a new parametric scaffolding with which to build the main seating surface, utilizing a single loft with 3 profiles rather than the original 3-loft system in Rev A or the single loft, 5 profile system in Rev B. The three-profile system proved to be the most mathematically graceful, while still allowing enough control to achieve appropriate ergonomic quality. This new system was carried through into the final seat pan design, and allowed the tweaking required to further iterate without starting anew. From this moment onwards the power of computer modeling became extremely valuable, allowing for rapid iteration and analysis.

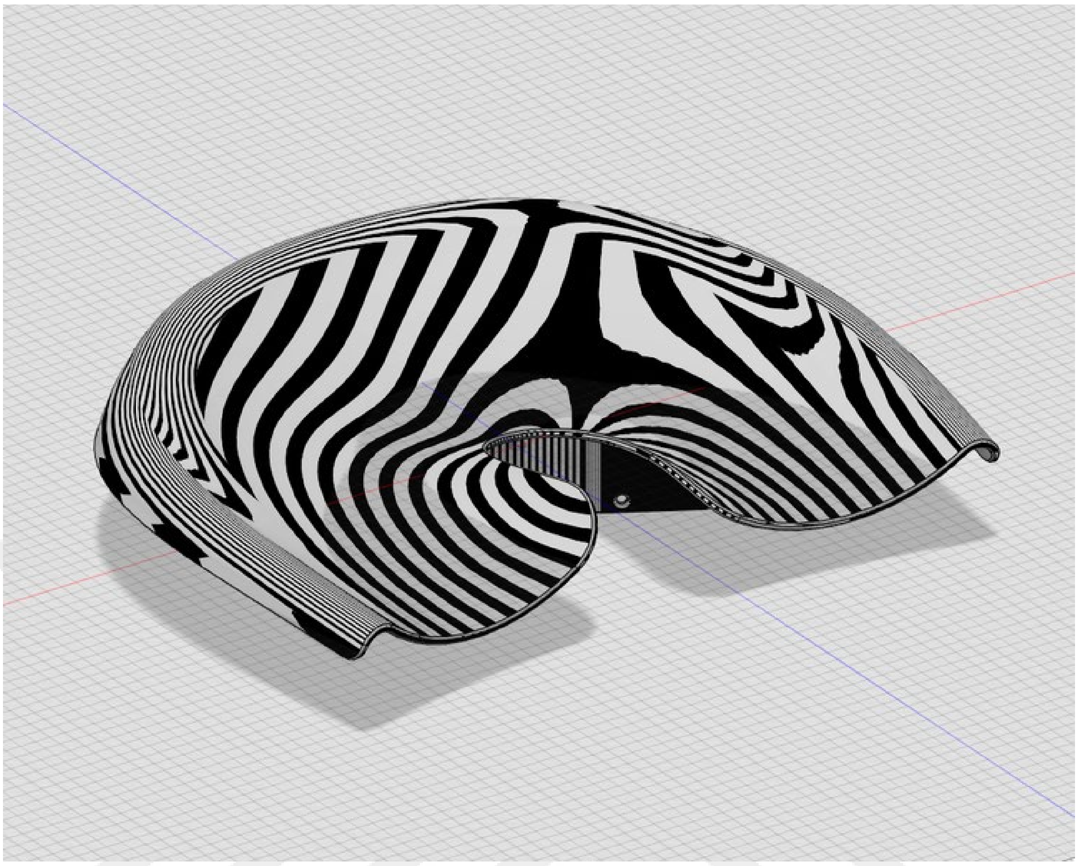

Figure 4.5. Seat pan, Rev C, zebra analysis

Rev C also proposes a second and third connection method to complement connection method 1, the three leg connection points. Connection method 2 is a set of 3 threaded features sitting just inside the leg connection points, and connection method 3 is a single 10mm threaded feature at the center of the base. In Rev C these two new connection features constitute the only undercuts.

4.2.2.4 Revision D

Figure 4.6. Seat pan, Rev D

Connection points 2 and 3 are replaced with heat-set threaded inserts which remove the undercuts previously required in these features. Connection point 1 is thinned and elongated to better match standard lumber sizes. The width of the cut-out between the thigh rests is reduced and made less significant in the overall design.

4.2.2.5 Revision E

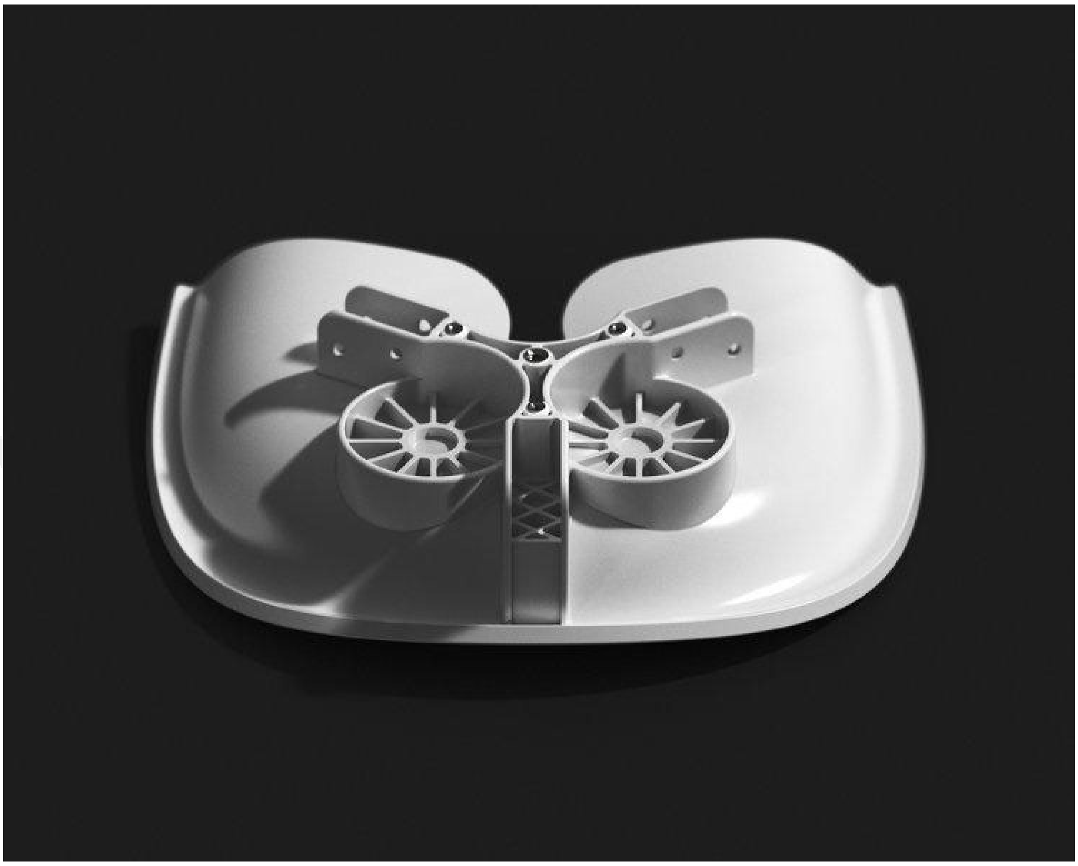

Figure 4.7. Seat pan, Rev E

Rev E has a thickened seat pan and an opaque material quality, emphasizing a focus on feasible design requirements within the research project. This revision marks a transition from broad concept design to a focus on smaller details, carrying the overall idea of the form and utility to something that can be easily manifested within the reality of the project. This design-for-manufacture (DFM) based exploration, while not identical to the process if this part were to be injection molded, was valuable to the RtD process and carries an insight applicable to real-world hybrid object creation.

Rev E also is the first version to include the large cylinder connection points (connection point 4), which serve to add rigidity to the form while inviting a fourth way for artisans to attach their parts to the seat pan.

4.2.2.6 Revision F

Figure 4.8. Seat pan, Rev F, SLA print

Rev F is only slightly modified from Rev E, primarily in order to make the most of understanding the true form as a 1:1 print. Several insights were drawn from this looks-like model that informed the production version of the seat (Rev G). First, the overall width and depth of the seat seemed 10-20% too small to accommodate most people. Second, the lip of the interior cut-out between the thigh supports was too tall and distracting. Third, the overall height of the object could be improved as well to take advantage of the large back lip and resulting back support. These changes to the CAD were all simply modified due to the parametrics defined in Rev C. Connection point sizes were made larger to match the larger seat pan surface as well.

4.2.2.7 Revision G

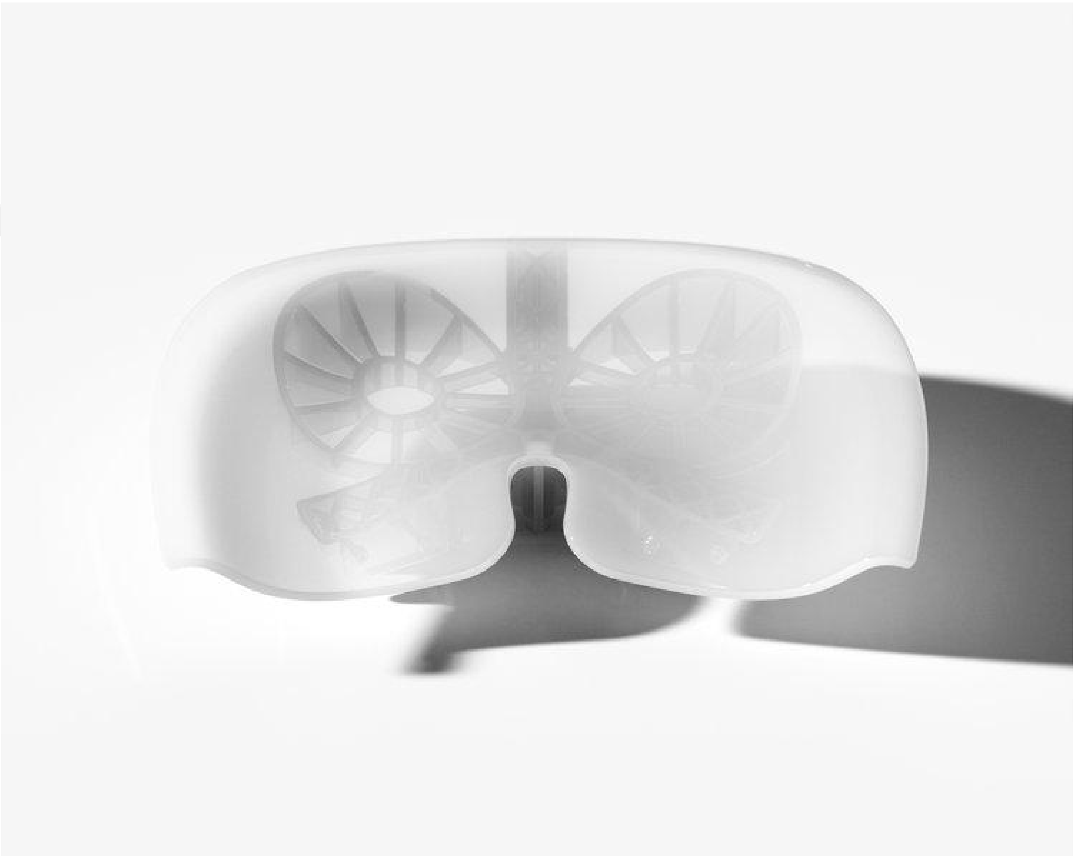

Figure 4.9. Seat pan, Rev G

Rev G is the CAD sent to manufacturers, and only includes a few small changes included after Rev F: a wider and deeper body, a smaller interior horseshoe shape, and ribbing on the support interior as a possible gluing surface. Despite accomplishing a generally effective imitation mass-produced seat pan, a few discrepancies between the vacuum-formed part and a hypothetical injection-molded part do exist. The goal of listing those differences here is to make clear which features in the real object may not truthfully represent the features of the hypothetical object it symbolizes, and also to grant further validity to the features not listed here.

First and most apparent to everyday users is likely the thickness of the seat pan itself. Due to unconfirmed structural qualities of the casting material, a lack of time to prototype the seat pan in a technically truthful way, and a general desire to err on the side of caution, the seat pan's top surface is a very thick 8mm. For reference IKEA's ODGER chair's seat pan and back are a wood pulp composite with a 5mm thickness.[3] IKEA's slightly less stable ADDE chair seat pan, while reinforced with steel pipes, is merely 2.5mm thick.[4] It is unknown and difficult to measure if this suspiciously non-standard thickness actively or passively affected users' cognitive understanding of this seat pan as a mass-produced, perfect part.

Second, while a traditionally injection-molded part may have a standard parting line that requires no post-processing, the semi-malleable nature of the silicone mold in the vacuum casting process creates flashing that requires post-processing. This means that the parting line itself, a signature feature of injection molded parts, is inherently different on these parts. Instead there are several tabs that've been removed in the factory by employing workmanship of risk methods.

4.2.3 Finding a Manufacturer

The seat pans were manufactured by a Chinese company based near Hong Kong. This decision was made for several reasons, generally cascading from a key belief that it is integral to the validity of the research project that these parts must look as mass-produced as possible. This means any craft errors, inconsistencies, or features

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[3] https://www.ikea.com.tr/en/catalog/dining-room/chairs/50457313/odger-chair.aspx

[4] https://www.ikea.com.tr/en/catalog/dining-room/chairs/90214285/adde-chair.aspx

that shatter the illusion could threaten the validity of the analysis of the final objects. The researcher was doubtful it would be able to match the craft and certainty of a professional company. Of course, within this feasibility constraint also lied financial and timeline constraints - both of which were surprisingly also alleviated by hiring professionals. More so than any specific timeline or quantified metric though, hiring a professional prototyping company reduced unknown risks.

Manufacturing these objects via an overseas third party also allowed for a more authentic experience of mass-manufacturing, where the designer and maker are linked only by a thin level of standardized communication. The hiring of an external company, specifically from Asia, justified the creation of color-materials-finish (CMF) documents, categorization of standard parts, and valuable email correspondence data with the other company itself. Even the request-for-quote (RFQ) process executed by the researcher revealed valuable insight to the mass manufacturing paradigm's opportunities and frustrations, and including a third party allowed those factors to be represented within the final objects. This experience enhanced the RtD authenticity and allowed for richer, more applicable research insight.

In order to find a suitable manufacturer the researcher sent RFQs with attached CAD and CMF documents (Appendix D). CAD included all hardware as well as the seat pan itself. The CMF (colors, materials, finish) document was divided into sections covering a look and feel summary with object renders, a materials call-out page, a hardware specification page, and a design notes page. The hardware specification page specified all required connection hardware with standard McMaster-Carr reference part numbers in order to avoid confusion. The design notes page mentioned two hesitancies, seat pan thickness and heat-set insert viability, that the researcher wanted confirmation on from the manufacturer before locking in the sent CAD. If more units had been ordered or if the researcher were utilizing an existing manufacturer relationship this list of DFM questions would have been longer, however the designer chose to keep the engineering related questions to a minimum in order to appeal to prototyping companies as an easy client.

The researcher reached out to three prototyping companies, two of which responded with quotes:

- Company A is based in İstanbul and positions itself as a DFM & prototyping company capable of both providing engineering and material performance guidance as well as small-run manufacturing and one-off parts fabrication. Despite being located in Turkey, much of Company A's online presence is in English; this suggests that the company focuses on providing solutions for the European market by taking advantage of its location as a more affordable manufacturing alternative. All correspondence with Company A was conducted in English.

- Company B is based in southeast China and focuses primarily on prototyping and small-run manufacturing, without the DFM or engineering consultancy offered by Company A. From correspondence it was clear to the researcher that Company B had a higher volume of business and likely a lower required performance spec for the parts it produced. Whereas Company A positioned itself as capable of high quality, looks-like prototypes, Company B focused most of its messaging on cosmetic realism. Communication with company B was also conducted in English.

After a series of back-and-forth emails with both companies discussing tolerances, hardware specs, and other miscellaneous small details not covered in the sent documents, both companies sent completed quotes to the designer. The researcher chose Company B primarily based on the wide price gap, but also based on quicker lead time and general desire to appropriately mimic the behavior of a for-profit company creating these objects.

4.2.4 Manufacturing the Seat Pan

The seat pans were manufactured by vacuum molding, a process in which a master part is machined and used to create a 2-or-more part silicone mold. Though in email correspondence the researcher made clear to companies that it would be open to manufacturing process suggestions, it was this vacuum molding process was proposed in the RFQ documents and imagined as the making method for the prototypes during the design process. Synthetic materials available for this process include all thermoset polyurethanes and epoxies, making it easy to mimic a wide variety of thermoplastics common to true mass manufacturing. Because of this advantage, vacuum molding is a common method for creating looks-like performs-like prototype replicas of injection molded parts. Based on part complexity the silicone molds used in this process generally last 10-25 runs. Company B kindly recorded their making process from CNCing the master part all the way through hand polishing (Appendix E).

Correspondence with Company B during the manufacturing process led to several delays, which may echo larger trends in overseas, cross-cultural production and prototyping endeavors. For example, a mix-up about hardware specs originally led to an unreasonably high quote from the Chinese Company B, which understood the specified codes in the CMF document to mean they were literally to purchase and import McMaster-Carr hardware (the meaning of the specs was only to provide reference products). Later, a second misunderstanding about the material color led to a revised material specification, after confusing “milk white” with “clear” materials, causing an increase in unit cost. Third, Company B ended up hand polishing each seat pan (at no extra charge, surprisingly) after the researcher requested a gloss finish that was clearly apparent on the product straight out of the mold (in the designer’s opinion). These misunderstandings can certainly be equally attributed to both sides of the conversation, if not more attributed to the researcher due to lack of experience, but as a whole they illustrate the designer’s lack of control over the final product even within the top-down making paradigm.

4.2.5 Seat Pan Production: Analysis

After a long delay in customs the seat pans arrived undamaged to Ankara on May 23, 2022, eight weeks after signing the original purchase order. They are indeed heavy (2.6kg), with thick walls and a sturdy construction. Overengineering the wall thicknesses and accepting the larger size will ensure durability in high use environments, another natural material benefit of the polyurethane. The hardware is of acceptable quality and fits nicely within the objects, though the threaded inserts are quite tight on the screws themselves. Some units have small but apparent scratches near the holes for the 3 leg connection points, which would have been added in post processing instead of as part of the vacuum mold process, though most signs of the manufacturing processes themselves are entirely invisible in the final product. The "2022" debossment, the gloss finish on the top surface, the consistency between units, and the rigidity of the seat pans are excellent.

On first glance the seat pans appear 10-15% wider than expected, and overall possess a heavy aura despite the milky clear gloss finish. As expected earlier in the RtD process, thickening the surfaces beyond what would be typical in an injection molded part clearly has changed the objects' presence relative to truly mass-produced seats. However, the added thickness only gives an added sense of durability and security and does not break the illusion of legitimacy.

Ergonomically, while certainly comfortable enough to use in this research project, a few parameters would be changed if this seat pan were ever to go into production. First, the aforementioned wideness would be slightly reduced, and the depth (front to back) of the object would be increased in order to move the tailbone backwards away from the crux of the horseshoe profile between the two thigh rests. A bit more height (top to bottom) would also need to be added in order to let the tailbone rest *within* the form rather than sit on top of it as it does now. Overall when resting flat the seat pan seems to encourage sliding forwards a bit, or even springing out of the seat itself - mitigating this is as simple as installing slightly longer front legs so to tilt the object backwards, but given a second production opportunity this would also be resolved before the product is given to craftspeople. Finally, a gloss finish on the top surface of this object feels slippery and a rougher textured surface would be more appropriate in most contexts in order to provide a more stable user experience (though the gloss finish may be more hygienic).

In summary, the seat pans are entirely appropriate for the research goals, and their shortcomings do not interfere with the researcher's ability to gain insight from their use in craft environments. Ultimately this also returns to the choice of the stool in the first place: while comfort is one parameter, pragmatism and durability also fall into the use case of this seating paradigm, so unlike a couch or a reading chair, all stools in some sense sacrifice comfort in order to provide a secondary practicality, responding to their specific use case in some other way.

4.3 Working with Artisans

In total, 144 artisans and atölyes were invited to participate; nine accepted, and therefore nine seat pans were distributed. All contacted artisans received a copy of the Project Information Sheet (appendix G) and the Design Guide (appendix H) along with their invitation to participate in the project, and had the opportunity to understand the project through the information provided on those documents before giving an answer. The distributed seat pan came with hardware included and a thank you note. No design intent was given to the artisans by the researcher, and the artisans were asked to use the distributed component in whatever way they saw fit.

The pair of documents standardized the information exchange between the artisans and the researcher, whose Turkish language skills are limited. The documents were provided in Turkish and English - originally written in English by the researcher & translated into Turkish by a native speaker with a strong understanding of the project. Within the documents the project is framed as a system to support artisans and provide a new path forward in collaboration with mass-produced parts, rather than keep the two paradigms at odds.

The first document, the Project Information Sheet, covered all the basics of the research: a brief project summary, a scope of work, budget, deadline, and other practical information. The Design Guide document provided technical information about the seat pan itself, including material, weight, dimensions, and standard connection point information. The Design Guide was deliberately created with photos rather than technical drawings because the researcher considered these to be easier to understand, or at least less intimidating, for creators who may not have been formally trained in design or production.

Participating artisans were not paid for their labor. However, artisans' material expenses up to 1000₺ were covered by the researcher, and the artisans' stools were returned to them after the exhibit at METU. The researcher felt that this provided enough performance-based incentive for the creators, while also encouraging creativity and experimentation instead of minimum viable production. For an artisan to opt into this system would be to show their interest in the research project because there is no other reason to participate. This structure is probably the main reason behind the low participation percentage: 5.5% of all contacted artisans, but only 2.2% of cold-contacted artisans, accepted the task. It is possible that this low participation percentage self-selected the most invested participants as intended.

Because the goal of this research project is to explore the potential of the novel hybrid approach, the researcher aimed to create the most plentiful and diverse slate of artisans as possible. With this goal in mind and as many as 10 seat pans to distribute, the researcher used several contact methods in the outreach phase: cold calls and emails, word of mouth introductions, friends of friends, and in-person cold introductions. Most of the failed distribution attempts ended in a non-response by the craftsperson or craftsperson's business. Almost all conversations with the craftspeople themselves led to participation conversions.

Objectively, diversity in artisans can be measured by material expertise, scale of enterprise, price point of typically sold objects, and other quantifiable data. For the sake of this research all those points were taken into consideration along with more qualitative information such as world view, reason for career path, and reason to participate in this project. This helps answer a secondary research question: *provided these finished objects show potential, what kinds of artisans would be most effective to work with in the future?* Explained in Chapter 5.4. In addition to maintaining as much insight as possible regarding successful work relationships, selecting a variety of artisans helps incorporate Turkish making culture as a primary focus at the crux of the project.

With the seat pans distributed, the researcher answered occasional questions and prepared for their return a few months later. The timing of stool returns varied greatly, with approximately half returning their objects by the deadline. The earliest stool was received 23 days before the deadline, and the latest stool was received 19 days after the deadline. All artisans submitted attempts at hybrid objects.

CHAPTER 5

EVALUATION OF HYBRID OBJECTS

Submitted hybrid objects were evaluated in three phases. First, objects were received and analyzed following the criteria outlined in Chapter 5.1. Submitted hybrid objects were analyzed by the researcher in terms of both design and workmanship because craftspeople were asked to finish both design of and creation of their stools. Second, based on the submitted objects and their appraised characteristics, artisans were interviewed in order to understand the motivations and decisions behind their submission. These questions are documented in Chapter 5.2. Each maker's entire interview transcript is available in the Appendices. Third, following individual analysis, key research trends of utility and narrative were extrapolated to examine the stools as a submission set in Chapter 5.4. This graphical analysis revealed new trends and supports broader discussion in Chapter 6.

5.1 Appraisal Criteria

Criteria were divided into design and workmanship categories to reflect categories created by the theorists from which the terms are borrowed. Design criteria assessed the ideal that the craftsperson attempted to manifest. Workmanship criteria assessed the craftsperson's degree of success in manifesting that design concept. Both categories are represented because artisans have responsibilities in their core practices to execute form-giving and object manifestation.

5.1.1 Design Criteria

Design criteria were roughly borrowed from Yanagi via his essay *What is Folk Craft?* (1933), where he defines *mingei* (craft for the masses) and the beautiful qualities instilled in these objects. Yanagi's definition of mingei provides aspirational criteria for the objects in this research. A few delineations and modifications to Yanagi's criteria were added to better aid this insight; those modifications are addressed here.

1. *Ease of Use: the ability of an object to afford its primary use case*

   Ease of use is an object's ability to sincerely accommodate its utility. For example, a task lamp's ease of use would be determined by the simplicity of changing its on/off state, dependability of the rotation mechanisms, and quality and directionality of the light. The criteria for ease of use change with each object but are always essential: if any of the ease of use criteria are unfulfilled, the object would be considered broken.

2. *Practicality: the ability of an object to exist easily within context when not executing its primary utility*

   Practicality measures an object's general ability to execute within its use case scenario. Objects with a high practicality are effective at their original intent, and also may possess supplementary features which are sympathetic to the general context of the object. An outdoor seating object must be comfortable to sit on, but it also must be waterproof and will ideally have UV resistant finishes. It may also need to stack for seasonal use and storage.

3. *Honesty: the object's ability to appear as a dependable means with which to execute its intended task.*

A product's honesty is a measure of congruency between its intended use case, utility, appearance, narrative, material selection, and resilience. An honest product's utility is usually recognizable after a short time. An honest product is also free of distracting or unnecessary features, distilling its storytelling to the user and staying true to essential facets.

4. *Naturalness: the adherence of an object's concepts to the constraints of nature*

Yanagi uses "naturalness" to complimentarily describe objects that, roughly, are sympathetic to the characteristics of the materials and processes used to create it. For example, he describes the earliest Ukiyo-e prints as more beautiful than the later ones because despite the later ones being more realistic, they were often meant to imitate painting - a different process. Yanagi states that the earlier prints were more "natural" because they were more typical of woodblock printing; they embraced the nature of the process rather than disguising it.

5. *Individuality: uniqueness among objects within a family or between makers*

In his essays Yanagi fiercely argues for anonymity in production, explaining the poisoning effect of individuality in handicrafts. Yanagi associates individuality with novelty, vanity, and fragility, qualities that conflict with his belief that the loveliest mingei are humble and understated products of natural constraints. Each of his case studies presents these ideals as the foundation for the beauty of the typological object he is praising in a given passage. Opposing Yanagi, Pye recognizes the workmanship of risk's variety as a welcome antidote to the ever-tightening grip of mass-produced homogeneity. Writing 40 years after Yanagi and in England instead of Japan, it is clear why Pye may give more credit to these small differences and celebrations of uniqueness. Furthermore, it is likely Pye's observations are from a context more similar to the contemporary world.

Pye diagnoses previous generations' love for highly regulated objects as a response to their relative scarcity before industrialization made objects produced by the workmanship of certainty a backdrop for everyday life. Pye then proposes that just, as highly regulated objects were of value before industrialization, objects exhibiting the variations made possible by the workmanship of risk could symbolize the same treasured diversity after the flip. Perhaps Yanagi's and Pye's contexts stand just opposite each other on this historical transition between prizing regulation and prizing diversity.

Looking at the collection of the Japan Folk Crafts Museum (of which Yanagi was a founding member and the first director), it is clear that a contemporary view of "anonymity" is much stricter than what must have been reasonable or expected in Yanagi's time. Almost all objects in the museum's collection possess some sort of flourish - whether a pattern, color, and form that deviates from the strict purpose-driven reason for the object's existence. Many of the objects in the collection apparently fit both Yanagi's definition of anonymity and Pye's desire for individuality.

Figure 5.1. Kimono-shaped coverlet with design of shells from Japanese Hand Crafts Museum.[5]

[5] Edo to Meiji period, 19th century. Acquired from https://mingeikan.or.jp/collection_series/japan_dyeing_weaving/?lang=en#group-3

5.1.2 Workmanship Criteria

Workmanship criteria are used as outlined in Pye's *The Nature and Art of Workmanship* (1968), directly borrowing some and tailoring others to better align with the needs of this research:

1. *Regulation: the extent to which the object's workmanship adheres to the formal ideal it is meant to express*

   A highly regulated object is an object whose imperfections are imperceptible by humans. The opposite of this high regulation is "rough" or even "free" workmanship, where the product is quite different from the design concept as described in documentation at the end of the design process. Importantly, Pye makes clear that a product's level of regulation is not an isolated variable with which to determine a product's overall workmanship. Rather, the situational context is an essential criterion: good workmanship results when a product's regulation is appropriate for its context. A surgical robot requires high regulation, even precision; a concrete footing for a back deck does not. It is worth noting that this criterion only applies when the design ideal is adhered to - in the hybrid making approach, this may be replaced with bottom-up making, where the object's design ideal is defined through workmanship action.

2. *Soundness: the sturdiness, resiliency, and durability of the final product*

   Soundness is the workmanship version of Yanagi's *honesty*: one inspires dependability, the other makes good on that promise. High soundness is contingent upon a sound design and is only the responsibility of the workman insofar as the design concept possesses a reasonable expectation of achievable sturdiness. A design concept of a chair with two legs is not sound.

3. *Comeliness: the preservation of the design intent, vision, and narrative*

The more abstract cousin of soundness is comeliness: if an object's soundness comes from its objective alignment with the concept's utility, an object's comeliness comes from its alignment with the concept's narrative. Objects with accurate comeliness possess a clear understanding of the narrative behind a design concept and make workmanship-level decisions on the basis of preserving that concept. For example, if a design concept calls for a flat wooden tabletop's flatness to be showcased, the workman may accentuate this feature by use of lumber with particularly straight grain. If the design concept calls for contrast between the physical and visual flatness, the workman may select a knottier stock. Objects with low comeliness feature workmanship decisions that are misaligned or naive to the design concept's intent and narrative.

4. *Diversity: the abundance of characteristics within an object at varying scales of viewership*

Pye's division between design and workmanship responsibility happens at the moment of handover of design documents from the designer to the workman. These documents generally, according to Pye, provide instructions for the production of the "ideal" design concept, but cannot dictate every detail and feature. The unresolved details and features are the arena of workmanship.

An object has a high diversity when its characteristics are gradually covered or revealed at different scales of experience. For example, when viewed from far away, only a building's broad shape and composition are perceivable by an observer. The observer is able to get closer revealing material choices, floorplan, colors, and so on and so forth, until the observer is so close that they have lost the understanding of the basic layout of the building and they are focusing simply on grout joints, hardware selection, ripples in the glass panes and floorboard widths. These small features are the domain of workmanship because they cannot be reasonably defined in design documents. An object with a high level of diversity has a consistent gradient of rewarding features at all scales, through design into workmanship. Pye also notes that lack of diversity is the primary shortcoming of mass production.

5. *Durability: An object's resiliency to use and wear over time*

Durability is soundness over time. Durability for different objects is assessed on different scales: a piece of paper and a building are expected to survive different amounts of time. In addition to use case, material selection affects durability: a stool made from wood and a stool made from plastic would create different expectations of durability.

Due to the above factors, durability is not innately good or bad. Often durability stands in direct contrast to practicality. Sometimes an object's durability outlasts its utility, meaning unnecessary sacrifices were made in order to extend durability to an unnecessary degree. Like regulation, durability should be assessed within an object's unique context and addressed with reason.

6. *Equivocality: incongruence or deception between material nature and object appearance*

Pye defines equivocality derogatorily as:

the effect of suggesting that whichever material is being used has simultaneously a pair, or set, of properties such as hardness and softness, or objective characteristics such as roughness and smoothness, which are necessarily incompatible with one another. Yet another kind of bad workmanship having a related result, such as a polished surface and a raw edge (Pye, 1968. Pp. 45)

Broadly this may be interpreted to mean any sort of material deception: making something hard look soft, making something heavy look light. This may be the workmanship equivalent of the "Honesty" design criteria. To Pye equivocality is something to avoid.

5.2 Interviewing the Artisans

Artisans were interviewed several weeks after their objects were returned to the researcher. Each interview consisted of a set of twelve scaled questions and twelve short answer questions. The scaled questions were a random assortment of themes, whereas the short answer questions fell into three categories: design considerations, working with the scale-produced part, and paradigm review. The questions are shown here:

survey questions

I believe the object I made is sturdy & durable.

disagree 1 2 3 4 5 *agree*

I believe the object I made is comfortable.

disagree 1 2 3 4 5 *agree*

I believe the object I made is unique.

disagree 1 2 3 4 5 *agree*

I am proud of what I created.

disagree 1 2 3 4 5 *agree*

I believe the part I made matches the part I was given.

disagree 1 2 3 4 5 *agree*

This project was satisfying to complete.

disagree 1 2 3 4 5 *agree*

Working with the scale-produced part was simple.

disagree 1 2 3 4 5 *agree*

I believe the object I made could easily be sold.

disagree 1 2 3 4 5 *agree*

It was easy to create the kind of object that I wanted to.

disagree 1 2 3 4 5 *agree*

The seat pan restricted what I was able to make well.

disagree	1	2	3	4	5	*agree*

I believe this making method has a place in our business.

disagree	1	2	3	4	5	*agree*

I'd be interested in using this making method in the future.

disagree	1	2	3	4	5	*agree*

interview questions

1. *design considerations*

    a. Why did you decide to finish the object in the way that you did?
    b. What were some of the considerations you thought about when deciding on the design of the object?
    c. How much time did you spend deciding on the design before you started working with the object?
    d. Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

2. *creating with the scale-produced part*

    a. What went into your decision about how to connect the top and the bottom parts?
    b. What was it like to adapt your workflow to incorporate the scale-produced part?
    c. What benefits and challenges came from using the scale-produced part?

d. How do you think the final object would be different if you hadn't used the scale-produced part?
e. If you were to do this project again, what would you change about your design?
f. In what ways could the scale-produced part be improved to match your style?

3. *paradigm review*

a. Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?
b. What kind of information would you need to feel confident about creating objects with scale-produced parts?

Questions were presented in both English and Turkish. Interviews were given online or in person depending on the geographic feasibility of a workshop visit and each artisan's computer access. For in-person interviews where the artisan preferred Turkish to English, a translator was present to facilitate the information flow.

5.3 Individual Stool Appraisal

As individual stools cannot be assessed in relation to each other, each is analyzed individually based on researcher appraisal and interview insight. All data for each stool will be presented here, in its analysis section. Overarching themes are drawn out after each stool is discussed in isolation.

5.3.1 Stool 1

Maker 1 is a medium-scale furniture and accessory company that designs and produces wooden objects in-house. Their products are typically solid wood. Maker 1 primarily markets online but also has an in-person storefront.

Maker 1's submission is a sturdy, complicated product that effectively fulfills utility criteria. The object has four ground connection points, each connected with thick laminations. Two small stretchers brace the two sides immediately beneath the seat pan. The seat pan is attached with a separate wood piece that mimics the triangular connection bank shapes on the base of the seat pan itself. The triangular pattern does not aesthetically match the base. Several wood species are included in this design, many of which are native to Anatolia. The entire wooden base is finished with a high gloss product, giving the contrasting wood species a homogenous sheen and surface quality.

Despite the complicated assembly the stool sits squarely on the ground and does not rock. There is no felt product on the bases of the legs. Some glue joints are visible and it is unclear as to how the large glue joints connecting different species will grow and shrink with changing humidity and temperature conditions. The glue as seen in the few gaps is a sort of epoxy product, instead of a standard wood glue. In one spot on the back left leg there is an errant bandsaw cut.

Table 5.1 Stool 1, General Information

Maker Location	İzmir
Introduction Type	Internet introduction
Typical Material	Wood
Business Type	Medium scale furniture design + production
Submission Material	polyurethane, wood (various species)
Stool Height	42cm
Stool Weight	9kg

Figure 5.2. Stool 1, overall

Figure 5.3. Stool 1, detail

Table 5.2 Stool 1, Researcher Appraisal

ease of use	5	The object is comfortable and very sturdy.
practicality	3	The polyurethane finish on the wooden parts affords outdoor use and storage. Heaviness makes moving around difficult. The object is not flat-packable.
honesty	5	The object is clearly sturdy and well built. Thick parts and stretchers inspire confidence.
naturalness	3	The object showcases natural material qualities through species diversity, but also distracts from this with a complicated form.
individuality	4	Several arbitrary design decisions (made without consideration to practicality) make this object plainly individual.
regulation	3	lines are straight and glue joints are generally well-aligned. small gaps are clear from certain angles. finish glossiness is inconsistent. Saw marks are apparent in one place.
soundness	4	Thick, bulky parts come together to create a dependable object. Some joints show small gaps. Despite large gluing surfaces it is unclear if gluing multiple species will deteriorate adhesion over time.
comeliness	4	The stool is an effective manifestation of the apparent design concept with the workman clearly understanding the importance of both form and species celebration in material selection. The design intent for the seat pan connection is unclear.
diversity	4	The object reveals myriad characteristics at each scale and angle of viewership with the exception of finish quality.
durability	4	The object's sturdy construction and thick face grain glue joints suggest a long lifetime.

equivocality	4	Materials behave exactly as expected to. The gloss finish on the wood removes some amount of materiality by making it more difficult to innately understand the solidity of the material.
cohesion	3	Visual weights, colors, and scale align well. The connection method between top and base was clearly not considered until immediately before assembly.

Table 5.3 Stool 1, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	4
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	4
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

5.3.1.1 Interview Takeaways

Maker 1's questionnaire responses support a generally positive perspective on their submitted object and on the hybrid process in general. Their responses to short answer questions shine some light on their design's lack of harmony, though, which is a point of agreement between the researcher and the maker:

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

We designed the stool and decided to use with which connection part we will connect with. After the production, the connection parts didn't fit perfectly with the legs so we needed to add a piece to offset the connections. We didn't had a prototype but we made revisions on the final product.

What benefits and challenges came from using the scale-produced part?

The advantage was the part made our work much easier, disadvantage was the connection parts limiting us. And also the color and material of the part, gives wood a more ordinary look when combination.

If you were to do this project again, what would you change about your process and/or final object?

We would have thought about the connection details more.

Conflicting with Maker 1's conviction that "this making process has a place in their business," some answers towards less abstract implementation questions received notable responses. Maker 1 was clear in several questions that scale-produced parts conflict with their brand identity, making the implementation of hybrid making within their existing workflow challenging:

> *Using screws is not something we prefer on our designs. Usually the wood is glued and clamped. As [company name] we do not prefer to use scale-produced parts.*

5.3.1.2 Key Insights: narrative in engineering and in brand identity

The stool is effective at combining the benefits of both production scales through its unmodified seat pan and variety of local wood species. The shapes and construction of Maker 1's submission would be unviable as mass production because of tight tolerances and its non-flat pack furniture product.

Maker 1 sought to showcase their capability in both form and material, choosing dynamic, intense, and functionally arbitrary proposals for both. The two talking points somewhat compete, as the complicated form makes it more difficult to read the beauty of the wood grain on flat or consistently curved surfaces. This being said, the wood as shown is objectively beautiful: large blocks of the species variety show the immense diversity in the material family. The complicated form does not detract from utility beyond a bit of extra weight.

Plain to see in both the object and the interview answers, Maker 1 designed a base that aimed to showcase the above features before considering how that base might attach to the seat pan. The seat pan connection is of rougher workmanship, does not follow the same design narrative as the rest of the object, and was not included in the (unsolicited) concept documents the researcher received from the company before production (Appendix J). This disharmony may be caused by the maker's inability or unwillingness to accommodate the technical requirements of the seat pan component, but it is likely that the difficulty could also be mitigated with a simpler seat pan connection or, as Maker 1 mentions in their interview, clearer directions.

Beyond the technical difficulties of combining the mass-produced part, Maker 1 mentions aesthetic difficulties as well. While other makers mention challenges incorporating the distributed part within the *object's* design language, Maker 1 notes the difficulties of incorporating any mass-produced part within their *brand* language.

Specifically as a small designer-maker woodshop, mass produced parts (whether seat pans or screws) are seen by Maker 1 as incompatible with their brand identity of heritage handicraft. While technical interface issues could be reduced over time with more research and iteration, incorporation of designed utilitarian components with local brands may be insurmountable even in the long term as long as consumer preferences bind local makers to marketing-style, Morrisian definitions of craft and authenticity.

5.3.2 Stool 2

Maker 2 is a small-scale design + manufacture furniture shop with a moderate online presence. Typically using solid wood, Maker 2 specializes in made-to-order custom pieces rather than standard retail.

Maker 2's submission presents the distributed component atop a monolithic wooden base with an identical profile. There is a slight reveal between the seat pan itself and the base, creating an illusion of weightlessness for the transparent part that contrasts with the heaviness of the wooden block that it sits upon. The wooden base also sits slightly above the ground. The wooden base is made of vertical strips varying between 1 and 3 centimeters in width, and appears to have been laminated with standard wood glue before being shaped by hand to match the profile of the seat pan. Slight hints of the end grain are visible through the reveal between the seat pan and base. The object is finished with a matte oil-based finish. Over time, a handful of small cracks have formed in the base, as the enormous block of laminated solid wood has not accommodated the expansion and contraction of the dozens of individual pieces. These splits measure between one and four millimeters wide, and approximately four to seven centimeters long.

Table 5.4 Stool 2, General Information

Maker Location	İstanbul
Introduction Type	Friend of a friend
Typical Material	Wood
Business Type	Medium scale furniture design + production
Submission Material	Polyurethane, white oak
Stool Height	44cm
Stool Weight	17.7kg

Figure 5.4. Stool 2, overall

Figure 5.5. Stool 2, detail

Table 5.5 Stool 2, Researcher Appraisal

ease of use	5	The seat pan is at a comfortable height and the object is very sturdy.
practicality	3	The object is heavy and does not disassemble.
honesty	5	the object's appearance and utility are exactly in line with each other.
naturalness	5	The object's form celebrates craftsmanship and materiality.
individuality	5	the object makes a provocatively simple, unique statement that is in line with its affordances.
regulation	4	small discrepancies between seat pan and extruded bottom form create interest in places where it is appropriate. Areas that require tight tolerances for visual or utilitarian effect are controlled as such.
soundness	4	The product is remarkably sturdy and generally sound. Cracks have begun to form as the weather becomes dryer.
comeliness	5	The design narrative is potently presented without distraction or dilution.
diversity	5	Striking overall form at distance is balanced with rewarding reveals, parts assembly, and grain close up.
durability	3	The object’s thick base displays permanence, however, the design does not account for expansion and contraction. Therefore, cracks are forming in the base. It is unclear if this will affect the object’s utility over time.
equivocality	5	Materials behave exactly as expected to.
cohesion	5	The object from distance is a single form while close-up rewards attention with immense diversity.

Table 5.6 Stool 2, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	4
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	4
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

5.3.2.1 Interview Insights

Maker 2, a medium scale design and fabrication furniture shop, appears to have followed a reasonably standard design methodology as far as determining form and creating the object itself. Specifically they mention proposing 20-30 concepts before fabrication. Further evidence is apparent in answers regarding design intent, where they specifically mention a desire for harmony and unity between the two pieces.

Perhaps due to this application of the company's standard design process, Maker 2 felt they were very successful in designing and making a good object, giving themselves 5s on each of the scaled questions about object quality. This assessment is in line with the analysis of the researcher. The researcher sees Maker 2's pride in the object in the object itself: effort-based workmanship indicators such as surface condition, finish quality, and ground interface are all clearly labored over in an attempt to finalize the product in such a way that the concept deserves. This is seen in the interview as clearly as it is seen in the object: Maker 2 answered 5 for both "I am proud of what I've created" and "This project was satisfying to complete."

Despite their conviction about the beauty of their submitted object, Maker 2 expressed some challenges when working with the given part by assigning a 3 to "Working with the scale-produced part (seat pan) was simple" and a 2 to "It was easy to create the kind of object that I wanted to." The question "The seat pan restricted what I was able to make well" also received a 4, demonstrating that the hybrid system was not easy for Maker 2 to participate in. These scores contrast against Maker 2's positive outlook towards hybrid making in general, scoring a 4 for both "I believe this making method has a place in our business" and "I'd be interested in using this making method in the future."

Maker 2's response to the final question, "What kind of information would you need to feel confident about creating objects with scale-produced parts?", is notable because of the implication that hybrid making may make design, along with production, more effective:

> *Of course, we see it as advantageous if it makes design and production more effective. Knowing the material used, knowing its limits and flexibility always ensures that more solid steps are taken in design.*

This quote suggests Maker 2 may believe despite some frustrations inherent to the hybrid making approach, it has potential.

5.3.2.2 Key Takeaways: narrative, agency, and the role of design

Stool 2's form is clearly the product of a local production paradigm. The overall form is heavy and does not break down, making large scale shipping, storage, and delivery inefficient. The solid wood construction, as supposed to laminate or veneer, would be challenging at scale. Selecting each individual piece of wood requires an informed workman with an incentive to perform high effort work. The naturalness of the material can make quality control problematic at scale, especially when a producer is not incentivized beyond minimum requirements. The hand-finished form and complex curves, clear indicators of workmanship of risk, cannot yet easily be adapted for efficient mass manufacture and are therefore evidence of locality.

Maker 2’s submission tells a deliberate story through design. The material contrast between the thick, heavy base and the transparent and glossy seat pan is exaggerated through form, in particular by the blockiness of the base and the reveal between the two parts. Of course, the seat pan is not levitating, it is simply attached in a different place, but it is worth noting because this sort of deception was rare among the artisan contributions and serves to embellish Maker 2’s object's narrative at the expense of the object's honesty. It is possible that this ability to produce narrative, preferring it even at the expense of honesty and soundness, is a designerly urge.

This desire to produce a story, to say something through the hybrid object, may be what led to the frustrations in Maker 2’s designing and making process despite optimistic scores regarding the future of the hybrid making paradigm. Abstractly Maker 2 was optimistic about hybrid making, but practically the limitations to their own agency seemed antagonizing. This frustration cannot be attributed to either this specific seat pan artifact’s shortcomings or the shortcomings of the paradigm in general; more research is required for resolution.

David Pye locates the transition from designing to creating when the designer (who may also be the workman) finalizes the concept in a set of drawings. Physical drawings or not, the information passed from the designer to the maker at this point represents the design *ideal* - the impossibly perfect version of the product, complete with mirror finishes and exact dimensions. Up to this point the process is additive because the designer is creating information and defining what the object ought to be. After this point the process is subtractive as the workman begins to manifest the concept with efficiency and a problem-by-problem approach. Maker 2’s design step is easy to recognize - not only because the object’s design is so far from what is efficient to make, but also because the cracks in the form represent conflict between their own internal designing and making roles.

Stool 2 shows both the design step and the workmanship step in their entirety. Many submitted objects are designed through a workmanship-heavy approach, solving problems one by one as they arise to finish with a sort of local maximum. This is unsurprising as most of the participants are primarily craftspeople and not necessarily designers. Maker 2’s design process eliminated that risk through typical design concept iteration but was apparently unhappy with the agency they needed to sacrifice in order to incorporate the seat pan component. This frustration is unique to the research participants whose companies offer design services or employ designers and is less evident in makers’ experiences whose businesses’ value propositions are less designerly.

5.3.3 Stool 3

Maker 3 is a three person operation with a private studio and a strong online presence. For ceramics, their products are large and sturdy, focusing on form and material over decoration. The researcher visited Maker 3's studio location in Çayollu, Ankara to give the distributed component. The space had no explicit storefront, but the owners mentioned they often hosted events or invited guests to visit the space. Their workshop represented a balance between experimentation and for-profit pieces: abundant variations on a limited set of themes demonstrated their tetheredness to market success (a hallmark of crafts making). The owners showed their space, their work, and their ceramics-adjacent side projects. Upon reception of the seat pan the team immediately began collaboratively brainstorming, drawing rough sketches directly on the table with pencil and discussing previous failed attempts to create valid ceramic furniture.

Created by a ceramics studio, Stool 3 uses the three leg slots to connect three nearly identical, rectangular legs to the seat pan component. Each leg is unglazed and shaped roughly with deliberately random lumps and scratches that accentuate the workmanship of risk and material quality of the clay. Each leg is fastened with a generous, unregulated dose of clear silicone. Drops of silicone are also on other parts of the legs.

Table 5.7 Stool 3, General Information

Maker Location	Ankara
Introduction Type	Friend of a friend
Typical Material	Ceramic
Business Type	Medium scale ceramics design + production
Submission Material	Polyurethane, red clay, silicone
Stool Height	33cm
Stool Weight	14kg

Figure 5.6. Stool 3, overall

Figure 5.7. Stool 3, detail

Table 5.8 Stool 3, Researcher Appraisal

ease of use	1	The stool is not sitable. The legs torque intensely when any weight is put on top non-directly and the silicone joints cannot regulate the verticality of the legs.
practicality	1	The object is not capable of fulfilling its primary use and is too fragile to help with other uses either. It does not flat pack.
honesty	4	The object’s legs’ surface finish, while deliberately accentuated, is unique to the material from which they are made. The joints are plainly silicone. There is no attempt to deceive.
naturalness	1	The object’s form is in direct conflict with its materiality.
individuality	2	the object makes no attempts to create a narrative beyond its material choice and surface finish.
regulation	1	Evidence of free workmanship is apparent in each design decision. The ceramic parts are unregulated in relationship to the seat pan slots and unregulated relative to each other. Their surface finish is deliberately rough and the ceramic is unglazed. The silicone joints are hastily applied without jig or template.
soundness	1	The product does not achieve its design intent whatsoever.
comeliness	2	It is impossible to imagine the design ideal behind this object because it is so masked by poor craftsmanship.
diversity	4	Simple forms that appeal at far range transition gradually to close-up understanding of surface finish and joint construction. The contrast between the gloss finish top and rough ceramic is harmonious.
durability	1	The object is effectively a one-time-use stool. It will almost certainly break if it is sat upon.

equivocality	2	Materials are asked to perform in ways that they do not.
cohesion	1	The object makes no references or design decisions based on locally unique opportunities or constraints.

Table 5.9 Stool 3, Artisan Appraisal

I believe the stool I made is sturdy & durable.	2
I believe the stool I made is comfortable.	2
I believe the stool I made is unique.	4
I am proud of what I created.	4
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	2
This project was satisfying to complete.	4
Working with the scale-produced part (seat pan) was simple.	4
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	2
I believe this making method has a place in our business.	4
I'd be interested in using this making method in the future.	4

5.3.3.1 Interview Insights

Maker 3 rated their end product poorly, in line with the researcher's appraisal. Both "I believe the stool I made is sturdy and durable" and "I believe the stool I made is comfortable" received 2s. Clearly this can be attributed to lack of either effort or capability: Maker 3 included in the short answer sections that they did not make prototypes and spent a total of four hours on the project. Maker 3 scored themselves a 4 in individuality, presumably because of the novelty of the object itself when assessed against non-hybrid objects (or non-ceramic furniture). Maker 3 referred to emotionally driven design decisions and narrative building frequently during the short answer section:

Why did you decide to finish the object in the way that you did?

While integrating a modern plastic material with a natural material, ceramic, we wanted to draw attention to the evolutionary process between these materials.

What were some of the considerations you thought about when deciding on the design of the object?

Harmony and contrast

What went into your decision about how to connect the top and the bottom parts?

This was not a moment of decision. It developed organically within the emotion desired to be felt.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

I think that certain emotional states will be needed more than knowledge. Excitement and stability.

What was it like to adapt your workflow to incorporate the scale-produced part?

Working with a ready-made piece is like a one-lane road to a certain emotional space. Many things you see on that road can be included in the design, which allows you to see more on a narrow road while restricting other options.

Maker 3's response to the final question is notable because it begins to reveal the design process modifications that are necessary to accommodate the hybrid object paradigm. Maker 3 concisely describes the idea that the object's narrative is already somewhat defined, and that instead of an overall concept, the artisan is to act more like a steward - creating an environment, or working process, that allows that original concept to flourish into what it had already been set out to become at seed.

Maker 3 responded "4" to both "I believe this making method has a place in our business" and "I'd be interested in using this making method in the future." This shows a resolute optimism. Despite failure to create a valid object (likely based on the nature of the vehicle object). Maker 3 still sees opportunity in incorporating mass-produced components into their existing workflow.

5.3.3.2 Key Takeaways: affording narrative & industry expertise

Little or no locality is present in this design as it uses globally available materials and production methods to create globally recognizable form. The business that created the submission has international connections and deliberately positions itself within a more global design language, rather than a Turkish one. Material finish or texture is somewhat mass producible, but not at the level of diversity apparent in these parts.

This submission suggests that the ability to control narrative is proportional to the amount of design agency given to the artisans, and inversely proportional to the engineering and utilitarian foolproof-ness of the distributed mass manufactured component. Maker 3 apparently felt caught in between these restrictions, unable to control narrative and simultaneously unable to produce utility. Their object shows either a lack of effort or a lack of capability to produce a valid seating object, which is not unexpected from a non-expert maker. However, it does suggest that the hybrid making approach is only able to demonstrate potential if a maker's natural expertise is at least tangential to the expertise required to produce the hybrid object type (in this case a stool).

5.3.4 Stool 4

Maker 4 is a university-educated glassworker based in Ankara. Focused primarily on artistic objects, their most recent work has been lighting fixture components and cast compositions.

Standing only 9cm off the ground, Maker 4's submission is a squat floor seat designed within the maker's trust of his material of expertise. The object has three legs of laminated sheet glass panes totaling the required 30mm to span the connection point (2x 3mm panes, 6x 4mm panes with different refractory behavior). The panes of each leg were first cut individually from a large pane, then stacked and fastened together with UV glue. The legs are fastened to the seat pan with the six included M6 hex bolts through holes drilled after lamination. The design is flat packable.

Poor glue lamination in at least one of the seven joints in each leg creates bubbles that create doubt against the legs' original blocky nature. Each lamination layer was cut individually, leading to small discrepancies between sizes. Holes for hardware were cut through the glass after lamination by marking locations during a dry fit. Holes are liberally sized, at approximately 9mm for the M6 screw; the tolerances are such that the extra diameter is put to good use.

Table 5.10 Stool 4, General Information

Maker Location	Ankara
Introduction Type	Friend of a friend
Typical Material	Glass
Business Type	Glass Sculpture
Submission Material	Polyurethane, sheet glass
Stool Height	9cm
Stool Weight	3.6kg

Figure 5.8. Stool 4, overall

Figure 5.9. Stool 4, detail

Table 5.11 Stool 4, Researcher Appraisal

ease of use	1	the seat is too low to the ground to be comfortable whatsoever.
practicality	3	The object is compact, easy to disassemble, and flat packs.
honesty	4	The solid and squat structure grants confidence despite being glass.
naturalness	4	The object works within the boundaries of the materials included. In the event that the materials are not fit for furniture use the naturalness of the design was prioritized over the utility.
individuality	2	The object is simple. Its novelty comes from the material selection.
regulation	2	Many pieces were hand-cut, hand-marked, and hand-glued without apparatuses. Many instances of these processes are apparent in the final product.
soundness	5	The squat design grants high soundness despite a traditionally fragile material.
comeliness	3	Workmanship with low regulation dilutes the power of the simple shapes in the design concept.
diversity	5	Residue from workmanship of risk naturally creates a scale of interest.
durability	5	The object is extremely resistant to regular wear and tear.
equivocality	4	The glass parts in particular exude solidity and strength rather than fragility.
cohesion	3	The object's two translucent materials interact in interesting ways.

Table 5.12 Stool 4, Artisan Appraisal

I believe the stool I made is sturdy & durable.	4
I believe the stool I made is comfortable.	4
I believe the stool I made is unique.	3
I am proud of what I created.	3
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	5
I believe this making method has a place in our business.	2
I'd be interested in using this making method in the future.	2

5.3.4.1 Interview Insights

Maker 4's interview answers depict their conviction that material, process, and form should always be considered holistically. Although Maker 4 is not a furniture designer and rarely creates objects of any utility, they used their understanding of their material and processes of expertise as sound foundation and justification for the way the object was completed.

Why did you decide to finish the object in the way that you did?

Since I used glass as the material for the stool legs, I only had as many shaping processes as the glass would allow, so I decided to work on a sharp and cubic form since the form I created should be able to be made with glass.

What were some of the considerations you thought about when deciding on the design of the object?

Since I used glass in the object design, I prioritized the light transmittance of the glass while creating the design.

What went into your decision about how to connect the top and the bottom parts?

Considering the possibility that the legs designed in the seating piece could be damaged in use, I thought that they should not be whole, so I decided to design the legs as modular.

If you were to do this project again, what would you change about your process and/or final object?

If I were to do it from the beginning, I could have obtained an unusual image by shaping the material I used with different production techniques. Since the material I use is fragile, I made a design by minimizing the risk and making it usable, I could develop this situation further and make a design that can be used comfortably in daily use.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

Yes, I see because as a designer, I don't/we don't have a command of every material, it is possible to be more productive by combining such mass-produced parts with the materials that we dominate.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

More information about the shaping and production of the material of the seat would be most helpful.

This fixation on material quality clearly informed Maker 4's design process from form description through level of regulation. It is truly material driven design, even if this is only because the project brief did not match the typical use cases of the material expertise of the maker.

Unlike many of the other artisans, Maker 4 assigned a relatively low "2" to both "I believe this making method has a place in our business" and "I'd be interested in using this making method in the future." This is understandable because of the inherent conflict between load bearing structural seating artifacts and decorative glasswork. The gap may be too wide to cross, even with the help of mass manufactured, distributed components.

5.3.4.2 Key Takeaways: material performance and professional limitations

Little evidence of locality appears in this object in form or in materiality, however, the glass material and the workmanship of risk used to create the glass legs has created a large amount of diversity in the object.

The maker's material of choice and background in sculpture, despite the glass sculptures often being larger than the stools submitted by any of the participants, did not easily translate to the load bearing and stress requirements in this project. The maker naturally pushed his material of expertise to the limit of what he felt was possible to submit as a valid object. The subsequently low utility is the consequence of this limitation, and a reasonable explanation as to why more glass seating objects don't exist. To need to choose between usability and validity is unnecessary while building this kind of object with more suitable materials.

During the researcher's visit, Maker 4 mentioned his desire to create more functional objects through his medium. Maker 4 immediately grasped the research topic and began asking questions to frame his understanding. "Am I allowed to cut up the seat pan?" and "If you have any more seat pans can I have those and make more?" are most memorable. The answers were yes and no respectively: yes because the seat pan is a tool for the designer/maker to create with, and no because the value of the multiple seat pans is that they come from a diverse background of makers.

5.3.5 Stool 5

Maker 5 is an Ankara-based master wood carver with over 40 years of experience. From his small shop in Ayrancı he creates new and restores old furniture in a variety of styles. His publicity is primarily word of mouth, and he and his wife say they are highly involved in Ankara’s high craftsmanship community.

This maker's design consists of three identical, curved legs, radiating from the center of the seat pan by using the included three slots with the M6 bolts and nuts (though the maker chose to remove the included washers). The three legs' curves complement the curves of the distributed seat pan component. Each leg is sawn from a piece of dimensional lumber, but tapers greatly in width and slightly in thickness as the leg approaches the ground. Soft radiuses on each of the four corners become more exaggerated towards the ground as well, creating a pleasantly cohesive form. Small notches are removed from each side of the top of each leg in order for it to slot appropriately into the receiving feature of the seat pan. The wood is a typical golden brown with a fine and straight grain. The material is finished with a water-based semi-gloss finish, giving the wooden components a buttery coloration and sheen that is likely to darken over time. The legs taper so much that they do splay slightly when the stool is sat upon. There are no rubber stoppers below the feet to grab the sitting surface and reduce this splay.

Table 5.13 Stool 5, General Information

Maker Location	Ankara
Introduction Type	Street introduction
Typical Material	Wood
Business Type	Local furniture production and repair
Submission Material	Polyurethane, wood
Stool Height	44cm
Stool Weight	3kg

Figure 5.10. Stool 5, overall

Figure 5.11. Stool 5, detail

Table 5.14 Stool 5, Researcher Appraisal

ease of use	4	The object is generally stable and comfortable, however the legs splay slightly when it is sat upon.
practicality	5	The object is lightweight and uses hardware joinery for easy transport and storage.
honesty	3	The legs of this stool are very thin, introducing some skepticism into the object's ability to fulfill its utility.
naturalness	4	The object is geometrically complex but structurally simple. Expectations of workmanship are moderate. Use case realities are generally considered, with the exceptions being the slight splay when the object is sat upon and the fragile finish.
individuality	4	The contrast between the seat pan and legs is intense despite both parts being familiar forms.
regulation	4	The stool generally accomplishes regulated design with finished surfaces, consistent finish, and repeated curves. Slightly deep saw cuts on joints lower the level of regulation without lowering the utility of the object.
soundness	3	The legs of the stool splay slightly when sat upon and torque slightly when twisted, however catastrophic failure is doubtful.
comeliness	5	The stool clearly demonstrates execution of a familiar Turkish design paradigm with which he is very experienced.
diversity	5	From large to small, large curves mimic the seat pan shape and a rich yellow oiled wood with a consistent semi-gloss finish that rewards closer viewership with measured grain selection that naturally balances the overall curvature.
durability	3	The object’s slight splay is cause for concern over time.

equivocality	5	Materials in the design are well-regulated and consistent. Each material performs as expected.
cohesion	2	The object is difficult to analyze beyond the abrasive contrast between seat pan and legs. The curves on the distributed component match the curves on the legs.

Table 5.15 Stool 5, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

5.3.5.1 Interview Insights

Maker 5 cruised through the interview coolly, answering all questionnaire questions with confidence in his own work and in the hybrid making approach. Through the short answer responses Maker 5 continued their bullish attitude:

> **How much time did you spend deciding on the design before you started working with the object?**

1 or 1.5 hours, but with 55 years experience before.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

No.

How much time did it take you to make the object?

About one day.

What was it like to adapt your workflow to incorporate the scale-produced part?

Positive, simple, and easy.

What benefits and challenges came from using the scale-produced part?

There were no disadvantages. The biggest advantage is that the process was fast.

How do you think the final object would be different if you hadn't used the scale-produced part?

It would have taken a longer time to complete the object.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

It was so easy this way. It worked easily.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

I think that we can make a difference in the number of sales.

Because Maker 5 is already an expert in making seats out of wood, including some stools on display in front of his shop, speed and convenience (and therefore cost) became the primary value for their enterprise.

Because Maker 5 did not have computer access the researcher was present during the survey answers. Maker 5 supplemented the recorded answers with school-specific questions, clearly demonstrating desire to perform his research role well. It is possible that this sincerity corrupted answers because they are so wholly optimistic.

5.3.5.2 Key Takeaways: self-reference, authenticity, and formal locality

Maker 5 is a furniture carving Usta with over 50 years' experience. Nothing in his answers indicate any sort of active or deliberate reference to Turkish antiques; on the contrary, evidence suggests his decision to add the anachronistic, super-local design parts was not self-referential and rather a sincere attempt to add beauty to the distributed component. Beyond the ostentatious form there is no significant locality as the tree and finish types are globally available. It is possible that because the handcrafted form requires workmanship of risk operations it is more affordable to produce in Turkey than in Europe or the United States.

Impossible to overlook in Stool 5 is the apparent disregard for cohesion between top and bottom; this maker clearly worked to emphasize his own shop's expertise, world view, and locality within the made artifact and made little effort to introduce harmony between the two pieces beyond matching curvature. The result is a provocative statement piece that draws out strong opinions based on cultural background. This object certainly has a story to tell, but the story is that of composition between the mass-manufactured distributed component and the locally made legs. Rather than controlling the narrative by incorporating the seat pan into a more traditional design, the maker chose to preserve its characteristics and juxtapose them against their more standard inclusions. The maker’s interview responses support a confidence in this decision.

5.3.6 Stool 6

Maker 6 is a woodworker making mostly small desktop-scale artifacts with cartesian technology (CNC and laser cutting, for example). His work is diverse, showcasing his own curiosity and confirming the close link between his personality and his practice. Throughout the timeline of this project Erol also produced wooden coffee mugs and metal knives.

Maker 6 happily participated in this project despite never meeting in person and communicating exclusively in Turkish. His seat pan was shipped to his studio in Eskişehir, where he is the only employee - truly designing and making all as one entity. After asking for clarification, Maker 6 quickly grasped the idea of the project and was happy to come up with a design for the object on his own without help, feedback, or approval from the researcher.

This submission props up the seat pan component with three identical walnut legs, using the three slots on the seat pan and the included hardware. Each of the three legs is thinner than the slot on the seat pan component, so each is shimmed with a 2-3 millimeter piece of wood of a contrasting color and species. In between the three legs is a metal support brace that is attached at the center M10 attachment point before lining the first 15 centimeters of each leg's inner face. The metal brace is attached to each leg with three countersunk screws, which do not all entirely enter the wood. The metal parts have an oily black patina.

Table 5.16 Stool 6, General Information

Maker Location	Eskişehir
Introduction Type	Internet introduction
Typical Material	Wood & Metal
Business Type	Small-scale design and production
Submission Material	Polyurethane, wood, steel
Stool Height	41cm

Stool Weight	3.7kg

Figure 5.12. Stool 6, overall

Figure 5.13. Stool 6, detail

Table 5.17 Stool 6, Researcher Appraisal

ease of use	5	The object is comfortable and very sturdy.
practicality	4	The object is reasonably lightweight and uses hardware joinery for easy transport and storage. Assembly and disassembly take significant time.
honesty	2	Thick parts and metal bracing inspire confidence in this design. Shims at the leg connection points, inappropriate screw selection between the metal brace and the legs, and stressful ground connection points introduce doubt.
naturalness	4	The object's design concept utilizes materials appropriately and presents them honestly.
individuality	3	The standard overall form is adorned with curious, uncommon details.
regulation	2	While overall design intent is maintained, details such as shims and poorly aligned hardware joints indicate hasty workmanship.
soundness	5	The object is durable and effectively executes its given task.
comeliness	3	Disappointing details detract from an understated, reasonable design intent.
diversity	4	Simple overall form when viewed at scale yields attention to wood grain and material finishes close up.
durability	4	The object is stable and materials are used in honest, and long-term ways.
equivocality	4	Materials generally appear as they act, without deception.
cohesion	2	Despite craft deficiencies, disrupt the harmony between the design intent of this object and the distributed component.

Table 5.18 Stool 6, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	4
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

5.3.6.1 Interview Insights

Maker 7 feels very confident about the object they created as well as the hybrid making approach in general. The maker's opinion conflicts with the analysis of the researcher on the topic of workmanship, where apparently the maker believes the level of regulation is appropriate for the project whereas the researcher finds the lack of regulation distracting from the overall narrative of the object. The maker's short answer responses show this low-precision approach by revealing its causes:

> **Why did you decide to finish the object in the way that you did?**
>
> *Having three (3) connection points and a thread in the middle that I can connect all of them with one piece reminded me of the work I came up with. I did my first thought without thinking of anything else.*

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

There was no trial, I went directly to the production of the original product.

How much time did it take you to make the object?

all in one day

What was it like to adapt your workflow to incorporate the scale-produced part?

I acted to finish the product directly, it was very easy to go over a ready-made piece without thinking about anything extra.

Maker 6 approached this project entirely as a workman with little notion of a design concept, or how that concept would manifest in reality.

5.3.6.2 Key Takeaways: a call and response design process

Apparent in Maker 6's submission are several features that demonstrate a design-as-you-go approach to object completion. Each walnut leg is shimmed with 2-3mm plywood rectangles in order to fit the legs appropriately with the three slots in the distributed component. The interior metal brace was likely added after the legs in order to provide extra strength and attaches to the legs with countersunk screws (though no countersunk bore hole is present). Pencil and pen markings for hole locations are evident on multiple locations in the piece.

5.3.7 Stool 7

Maker 7 is an Ankaran, Kale-based art and design shop with a focus on selling decorative non-functional or minimally functional objects.

This stool is almost a complete object with the distributed component attached atop of it. Four tube stock legs protrude down from a laser-cut or water jet-cut steel plate that sits below the seat pan and mimics its bottom cut out profile. The rear two of these legs are cocked outwards and the front two remain vertical. The four total center screw holes are used to fasten the cut plate to the seat pan. The removable seat back part is another welded construction, using twice-bent bar stock attached at both ends with physical hardware. The seat back itself is slumped acrylic or a similar material but does not match the seat pan.

Free workmanship is apparent in this object from top to bottom. The seat back does not align symmetrically, slumping slightly to the right. The bar stock support is left open on the top and welds are unground throughout the design. Legs' bumpers do not align with the tube stock itself. Paint is already chipping from the metal parts.

Table 5.19 Stool 7, General Information

Maker Location	Ankara
Introduction Type	Street introduction
Typical Material	Wood
Business Type	Small-scale wood design + production
Submission Material	Polyurethane, steel, acrylic
Stool Height	49cm
Stool Weight	7kg

Figure 5.14. Stool 7, overall

Figure 5.15. Stool 7, detail

Table 5.20 Stool 7, Researcher Appraisal

ease of use	2	The object's high seat pan and spindly legs make for an uncomfortable seating experience. The seat back provides some extra comfort.
practicality	2	The object is reasonably lightweight and uses hardware connections. The seat back is removable. The object does not flat pack.
honesty	1	The splayed back legs, relative to the straight front legs, provide a deep sense of doubt in the object's integrity. The cocked seat back shows hasty workmanship of risk maneuvers.
naturalness	2	This stool is the product of a zany design concept manifested step by step with little foresight as to how those steps would wholly manifest.
individuality	5	The object clearly symbolizes the one-by-one problem solving, communal creation, and bottom-up form manifestation ideology of its makers.
regulation	1	Connection points are rough and welds are unground. The seat back is asymmetrically attached. metal is cut and folded crudely. joints do not align.
soundness	4	With the exception of some twisting from the thinness of the legs, the stool is sturdy and reliable.
comeliness	2	rough workmanship distracts from and casts doubt upon the original design intent.
diversity	4	material conditions, asymmetries, and craft errors create abundant, if not rewarding, diversity at close scale while unique overall form anchors the long-distance end of the gradient.

durability	3	Wiggling legs and asymmetry introduce suspicion in opposition to the solid welded metal construction.
equivocality	3	materials are easily identifiable and used in accordance with their general qualities.
cohesion	2	The object reads as a collection of parts.

Table 5.21 Stool 7, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	4
I believe the part I made matches the part I was given.	4
I believe the stool I made could easily be sold.	4
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	3
It was easy to create the kind of object that I wanted to.	3
The seat pan restricted what I was able to make well.	3
I believe this making method has a place in our business.	2
I'd be interested in using this making method in the future.	4

5.3.7.1 Interview Insights

Oddly, Maker 7's short answer questions support a sincere effort to follow a typical design process. Maker 7 cites comfort as the primary motivation behind the design, mentions the existing seat pan component's connection capabilities were a primary design constraint, made prototypes and alternatives, and spent approximately two weeks on the design process whereas other artisans typically spent a day or less. When asked what they would change about their submission if they were to do it again, Maker 7 suggests they would remove detail and perhaps experiment with color

- showing a natural desire to continue narrative development. Somehow these processes yielded an object that does not feel cohesive or premeditated at any level above each individual feature.

5.3.7.2 Key Takeaways: designerly decisions in an arbitrary context

Maker 7 was immediately very happy to help with this project, though they were hesitant to make design decisions without researcher approval or feedback. They originally accepted the invitation to participate on the grounds that the researchers would return to their studio in the following weeks in order to help them design the object - a stipulation that was accepted at the time but, upon the agreed-upon return, returned to the research standard. Nevertheless the researcher was able to enjoy watching the duo design between common interactions such as “what do you think?” and the standard response, “whatever you want to do, I will say yes”. At one point Maker 7 gave the researcher a design criticism, saying that it was a shame there were only three slots for legs rather than four, which would be more stable.

There is no evidence of locality in material selection or making processes, whoever the variety of materials used and the dissonance between components may be symptoms of the communal making process, where Maker 7 started with a general idea then contracted small jobs to friends with one-capability making spaces.

Apart from violating some basic designerly rules of thumb (symmetry, color matching, negative space, and so on), the overall object has no discernible narrative. The modicum of design agency given to Maker 7 seems to be chopped into small pieces and used one by one, mirroring the fact that different parts were made in different shops by different stakeholders. This approach manifests a final object in which a quilt work of design solutions exist simultaneously, unable or unwilling to communicate with each other to create any sort of theme. Maker 7 does mention that their acrylic-like back plate is meant to match the seat pan material, but the difference is unmistakable in photographs and in person.

5.3.8 Stool 8

Maker 8 is a Kale-based metalworker who primarily does small fabrication and repair jobs for neighbors and tourists. Mainly focused on production rather than design, Mehmet shows his expertise through replicating and fabricating based on photos or ideas rather than creating his own concepts.

The researcher found Maker 8 through an introduction from a tourist shop's seller, who mentioned that she used him for repair work and custom objects. He happily invited us into his one room shop, clearly organized in a way which only he understood. Helping Maker 8 understand the task of the project was difficult, as he continuously asked for a design (or at least design guidance). When not given, Mehmet began proposing shapes or ideas and watching us for approval. We were clear that all ideas were equally valid for the research because they were his own, and, echoing the distribution documents, that we would be most excited to see something that he was proud to have made.

The seat pan sits (and spins) upon a rotationally symmetrical, black metal construction. A small circular plate with an approximately 200mm diameter fastens the seat pan to the metal construction. A wide circular metal base with felt pads underneath acts as a single foot. Between the two circles is the slightly skinny post that holds up the seat. The seat pan is uncomfortably tall, and the slender center post wobbles slightly in an unpleasant manner. The paint quality is good.

Table 5.22 Stool 8, General Information

Maker Location	Ankara
Introduction Type	Street introduction
Typical Material	Metal
Business Type	Small-scale metal repair + production
Submission Material	Polyurethane, steel
Stool Height	50cm

Stool Weight	7.1kg

Figure 5.16. Stool 8, overall

Figure 5.17. Stool 8, detail

Table 5.23 Stool 8, Researcher Appraisal

ease of use	3	The object's high seat pan and slightly wobbly post make it uncomfortable and unsatisfying to use, but the object is valid.
practicality	3	The object is easy to carry, very durable, and disassemblable although it does not flat pack. The seat pan also swivels.
honesty	3	The object's single post design is honest in that it is as unsteady as it looks.
naturalness	4	The object is built well within the natural constraints of the materials and processes utilized.
individuality	1	A well-trodden path to utility is apparent in this object that shows few expressions of individuality.
regulation	3	Welds are somewhat polished (with some pitting) and some machined textures are apparent. The semi-gloss black paint gives the form a cohesive togetherness and may mask other instances of workmanship of risk gone awry.
soundness	3	the object wobbles slightly when sat upon but not in such a way that threatens failure.
comeliness	4	The design intent, in so far as it was determined before making, seems apparent in its simplicity.
diversity	4	General workmanship of risk residue creates complexity at close scales. Paint reduces the attention to these artifacts.
durability	3	Despite strong welds, the stem bends slightly and the rotational component is expected to fail.
equivocality	5	Materials are utilized honestly and perform as expected. No novelty is apparent in this object.

cohesion	3	The base and top are incongruent but do not compete against each other for attention. The base takes a passive role allowing the seat pan to capture interest.

Table 5.24 Stool 8, Artisan Appraisal

I believe the stool I made is sturdy & durable.	4
I believe the stool I made is comfortable.	3
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	2
I believe this making method has a place in our business.	4
I'd be interested in using this making method in the future.	5

5.3.8.1 Interview Insights

Maker 8 was generally lukewarm on the sturdiness, comfort, and cohesion of their submission, giving those three questions a 4, 3, and 3 respectively. Regarding the moderate comfort score Maker 8 quickly offered design suggestions for the seat pan, attributing the lack of comfort to the distributed component. The suggested edits were to add a back or arm rests, effectively changing the vehicle object from a stool to a chair. Maker 8 critiqued his stool submission against other seating solutions for different use cases.

Maker 8's sincerity and effort in the making process are evident in both the submitted object and the answers to the interview questions. Formally the object is well painted and sturdy, and while the design is simple the workmanship quality is reasonably highly regulated. The interview revealed that Maker 8 made multiple prototypes, invested time to achieve the rotation mechanism, and took 16 working hours to make only the final piece.

5.3.8.2 Key Takeaways: problem solving as a design approach

Maker 8's stool uses materials and processes available across the world to create a product that, formally, has no significant locality. That being said, like Maker 7, Maker 8 is a participant in the local, culturally specific network of small scale makers and artisans: in this way the importance of Stool 8's locality is in its supply chain and economic benefit.

Maker 8's submission is a stool that represents explicit problem solving in lieu of abstract design work. The composition is reasonable with no arbitrary details, colors, decorations, or designerly flare. This understated design would be more impactful with nicer proportions or a more consistent surface condition, however, the simplicity of the overall form is not problematic. It represents the maker's practical problem-solving approach.

Stool 8 makes a compelling case for the benefits of mass-manufactured objects in the Turkish context where Ustas like Maker 8 are common. The ustas are not handymen, not manufacturers, and not designers. The distributed seat pan component slotted into Maker 8's existing workflow well, allowing him to use his typical hands-on experimentation and bottom-up, moderately regulated work style to complete the object in a way he found pleasant.

When the researcher first met with Maker 8, even after the researcher said they could not design or be collaborative whatsoever, Maker 8 continued to ask questions about what the researcher wanted. When the researcher did not provide information, the maker began making propositions and searching for judgment on those proposals. Perhaps Maker 8 could have benefitted from more restriction of agency. The amount of creative control foisted upon their typical design and problem-solving practice may have been an unwanted journey into deep waters.

5.3.9 Stool 9

Maker 9 is a medium-scale metal fabrication shop with standard machining and weld assembly capabilities, as well as a sizeable laser cut and press brake sheet metal assembly operation.

Maker 9's seat pan sits upon a rotationally symmetrical, raw steel construction. A small circular plate with an approximately 200mm diameter fastens the seat pan to the metal construction. A wide circular metal base acts as a single foot, making contact directly with the ground without any abrasion mitigation. Between the two circular metal plates is a thick tube stock post that holds up the seat. The seat pan is uncomfortably tall, welds and cut marks are apparent, and the unfinished material shows both its production processes and the processes used to assemble the stock into this form.

Table 5.25 Stool 9, General Information

Maker Location	Ankara
Introduction Type	Friend of a friend
Typical Material	Metal
Business Type	Medium scale metal production
Submission Material	Polyurethane, steel
Stool Height	52cm
Stool Weight	9kg

Figure 5.18. Stool 9, overall

Figure 5.19. Stool 9, detail

Table 5.26 Stool 9, Researcher Appraisal

ease of use	2	The extremely high seat pan is attached to a very stable base, but without a footrest.
practicality	2	The object is durable but very heavy and not easily deconstructed.
honesty	3	The object generally performs as seen. Tack welds instead of full welds create some doubt.
naturalness	3	The simple design leans heavily on existing paradigms in order to be produced effectively. The design does not bring out the material in any aesthetic way.
individuality	1	This object is not unique beyond the path of least resistance.
regulation	1	Saw marks, weld burns, weld spatter, and raw material blemishes are apparent throughout the object.
soundness	5	The object is, while not ergonomically exceptional, extremely stable and durable.
comeliness	4	The object adheres to the low fidelity design intent.
diversity	4	Workmanship of risk details provide interest at close scale while simple form dominates distanced viewership.
durability	4	The object is extremely sturdy. A lack of protective coating leaves it prone to rust.
equivocality	4	Materials perform as expected with no attempt to push capabilities or propose new use cases.
cohesion	2	The base and top are incongruent but do not compete against each other for attention. The base takes a passive role allowing the seat pan to capture interest.

Table 5.27 Stool 9, Artisan Appraisal

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	3
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

5.3.9.1 Interview Insights

Maker 9 has a high opinion of their submission, conflicting with the appraisal of the researcher: "I believe the stool I made is sturdy and durable," "I believe the stool I made is comfortable," and "I believe the stool I made is unique" all scored 5s. Many short answer questions support this bold perspective:

Why did you decide to finish the object in the way that you did?

I decided to adapt to human physiology and an ergonomic design thought.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

I didn't make a prototype. The reason why I didn't do it is because of the experience and experience we have as a company.

Maker 9's justifications for their design decisions are primarily engineering priorities: they also mention strength, material qualities as primary reasons for creating what they did.

5.3.9.2 Key Takeaways: design agency for non-designers

It is unclear if Maker 9 accurately understood the project brief. In two questions near the end of the interview, they answered questions about the hybrid making paradigm with answers that imply that this part is a prototype for some mass-manufactured object that they would create for the researcher in the future in their shop. The answers almost read like advertisements, making it impossible to conclusively analyze Stool 9 from a locality sense - they may have been implicitly using mass manufacturability as a design criterion. This object has little or no evidence of locality, as the form and materials are globally available and the maker's business sits squarely within standard small manufacturing.

Originally the stool was chosen as the vehicle object for this research project because the parts with utilitarian complexity could easily be physically separated from the parts with less strict success parameters. The seat pan was utility oriented, whereas the legs were narrative oriented. This generally holds true, however the two main utility criteria unable to be controlled through the seat pan part are stability and height. Because of its tallness Stool 9 fails to achieve good ergonomic utility. Even though the seat pan is implemented in a durable way, the object's use is lesser than the other submissions because of this discomfort.

The decision to add a height restriction again raises the question of design agency, and specifically where to draw the line between mass-produced ID and artisan control. Maker 9 is unique because they, through their interview responses, show a strong and misplaced confidence in their ability to achieve ergonomic comfort.

5.4 Collective Research Insights

Participants' submissions and interview responses revealed the two main points of agency that are inherently restricted, from the artisan perspective, in the hybrid making approach. The first point of agency, utility, is deliberately supported as much as possible by the distributed component but cannot be afforded entirely. The other point of agency, narrative, is meant to be entirely sidestepped by the distributed component but is inevitably somewhat included.

In theory, the ideal distributed artifact in the hybrid making paradigm would achieve all utility requirements without removing any narrative agency for the maker; in practice this ideal can only be asymptotically approached, and the data suggests it is the willingness and ability of the maker to tolerate these constraints (i.e., go along with the narrative that they identify in the distributed component) that defines the success of the produced artifact. The closeness of a distributed component to this ideal dictates its quality because there is no possibility of ever reaching the ideal itself. The hybrid making approach does not produce valid objects when the distributed component cannot approach this ideal. A distributed component that entirely managed utility would be a complete object independent of artisan contribution, and a distributed component barren of narrative would need to be entirely imperceptible by a user, thus also nullifying hybridity. Therefore although these two limits must be approached in order to achieve the *ideal* distributed component, reaching them in practice is as undesirable as it is unattainable because it would no longer be "hybrid" as defined by this research aim.

Utility is the ability to create a valid, reasonable object: in this case a stool that works well as a seating object. In the hybrid approach it is an artisan's ability to patch the remaining gaps in utility that are not managed by the distributed component. For the artisan, utilitarian agency is supported because the mass-manufactured part is responsible for most of this requirement because it provides a head start.

In this RtD journey the distributed component did successfully manage several ergonomic criteria and raised the overall comfort and soundness of all the submitted artifacts over what would have been created by the artisans otherwise, based on each artisans' interview answers and existing portfolio. This being said the seat pan deliberately left some utilitarian criteria undefined, with the most notable exceptions being seat height and stability. These remaining utilitarian responsibilities were easily managed by artisans who routinely create similar objects in materials that afford typical scale. However, if either of these criteria was not met, artisans failed: Makers 8 and 9 created artifacts out of appropriate materials but failed to place the seat pan at a reasonable height, probably due to lack of furniture design experience. Maker 4 was unable to achieve a reasonable height, even if they desired to do so, because of the restrictions of their chosen material. Maker 3 failed to create a stable object.

Narrative is the ability to tell a cohesive and impactful design story through the nature of the artifact beyond its direct utilitarian affordances. Narrative capability in this research journey is an artisan's capability to adapt their object's story to whatever narrative leaked from the seat pan, namely, from the designer's perspective, clear plastic materiality and sweeping curvatures.[6] Opposite of *utilitarian* agency, *narrative* agency is restricted because this research's data suggests that narrative-free design is an unattainable ideal. The mass-manufactured distributed component is apparently unable to be undefined enough to slot into any narrative the artisan wants to tell so long as there is designerly utilitarian benefit. In some way the artisan always must respond to the distributed component in an

[6] It should be noted that plainly "hybrid-made" is not a narrative that is assessed in this research because the aim is to understand if this low-level production story can be supplemented by true design work rather than process-driven justification. This is not to say production stories are inauthentic or useless, only that because it is a constant the research team did not assess its value against non-hybrid objects.

adaptive way, finishing the creative output of someone else. This is apparently a hard thing to do.

Based on the above criteria, each of the nine submissions can be assigned a location on an XY grid where the X axis represents utility capability and the Y axis represents narrative capability (Figure 5.20) of the artisan. Semantically, capability can almost be substituted with interest, willingness, or desire, but ultimately capability is the assigned word because all these other definitions produce incapability if they are not present. This word choice accounts for variations in each maker's unique motivations. The twelve appraisal metrics from Chapter 5.3 were grouped into two groups of six, one representing utility and the other representing narrative (Table 5.1):

Table 5.28 Utility and Narrative metrics, grouped

Utility metrics	*Narrative metrics*
Ease of use	Honesty
Practicality	Naturalness
Comeliness	Individuality
Regulation	Diversity
Soundness	Equivocality
Durability	Cohesion

Capability score was determined by totaling the sum of each stool's points for each of the capability types. In utility, "ease of use" was weighted double, while soundness and durability were weighted half in order to better align criteria with their value towards utility capability as a whole. Narrative criteria were all weighted equally. Once each submission's utility capability and narrative capability is calculated, they can be plotted graphically as such:

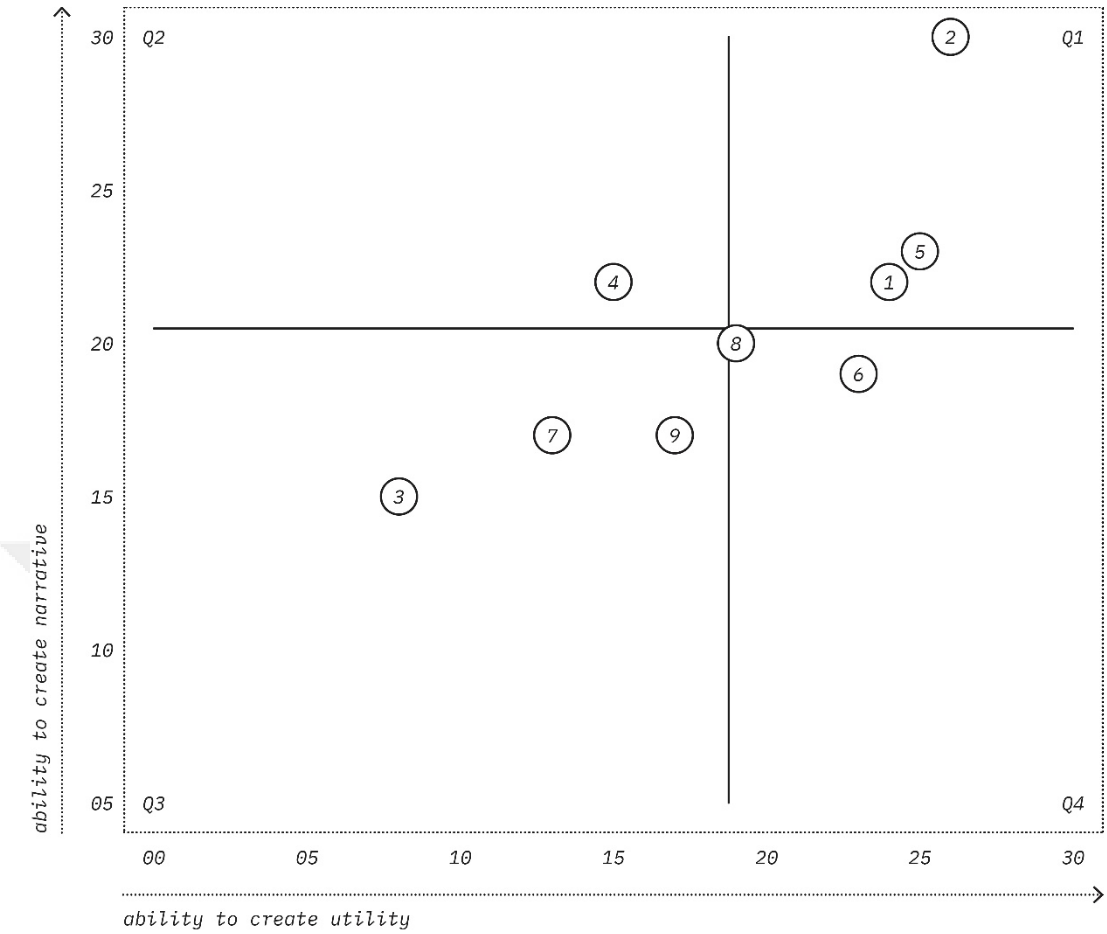

Figure 5.20. Graph showing each artisan's capabilities when using the hybrid making approach

Figure 5.20 shows each maker's location, when using the hybrid making approach, on the utility/narrative matrix. Figure 5.20 represents the approximate location of each maker's submitted object, though it is as much a visualization of each artisan's capabilities when using the hybrid approach. With more objects produced by each artisan this graph would represent the artisan's capabilities as an average of the locations of each individual submission. Because there is only one object submission per artisan, the average of the single location is the location itself. The average utility and narrative capabilities of the participating artisans are marked, with vertical and horizontal black lines respectively, intersecting slightly behind the position of Stool 8. It must be noted that this visualization strategy shows each artisan's capabilities based on the specific object type chosen as the vehicle object for this study and that it is not known yet if these positions represent these makers' hybrid making capabilities as a whole. For example, makers 3 and 4, a ceramicist and a glassworker, would likely demonstrate greater utility if the object had been something more standard to their media and their businesses' typical processes. It is also important to note these locations are strictly based on the appraisals of the researcher and do not incorporate artisans' opinions about their own objects.

Based on submitted objects' distribution, participants can be roughly grouped into four groups in order to better understand the effects of the hybrid making approach specific to each maker type. These groups roughly correspond with XY grid quadrants as demarcated by the average utility and narrative capability scores and are thus named using the same system. Quadrants are demarcated relative to the average score instead of an arbitrary origin. Also, positions are not objective enough to justify strict guidelines, and can only be discussed in general terms because they were not determined through a comprehensive multi-participant study.

Stools 1, 5, and 2 score highly in utility and in narrative, demonstrating that their makers have high ability to create utility and narrative. This group will be referred to as Group I. Stool 4 (Group II) scores relatively lowly on utility but highly in narrative. Stools 3, 7 and 9 (Group III) score lowly on utility and lowly in narrative. Stools 6 and 8 (Group IV) score highly in utility but lowly in narrative. These differentiations are helpful because they divide participants into sets that are likely to respond to changes in the distributed component in similar ways. The diversity between participants creates a need to diversify analysis. These groups as well as all graphical analyses are meant only to explore potential patterns and would be expected to increase in resolution with future contributions in this research area.

5.4.1 Defining Characteristics of Group I

Group I denotes artisans that achieve high utility capability and high narrative capability in the hybrid making approach. From the nine submitted artifacts Stools 1, 2, and 5 fall into this category. Stool 1, despite a bizarre joint between the distributed component and the bespoke base, is extremely sturdy and tells a rich story about wood as a material by celebrating its naturalness in relation to the clear white plastic seat pan. Stool 2 is also quite sound and tells the undiluted making story of marrying mass production and local craft, complete with high diversity and abundant (highly regulated) workmanship of risk. Stool 5, though perhaps not suitable for heavier users, possesses appropriate soundness while telling a design story that celebrates traditional Turkish woodcarving in the context of, but not in competition with, the distributed component. All three of these objects were made by furniture professionals in businesses that utilize design *and* fabrication for value addition, meaning they are well versed in both the utility and narrative facets of similar objects.

5.4.2 Defining Characteristics of Group II

Group II denotes artisans that achieve low utility capability and high narrative capability when using the hybrid making approach. In this research the only artisan falling into Group II is Maker 4, with their short glass submission. Stool 4 successfully creates a valid object that celebrates its material story and interfaces gracefully with the distributed component, but material constraints in the artisan's material of expertise, glass, limits the height of the object and therefore its utility. Maker 4's practice is material-specific with advanced educational experience and years of recognition in their field for artistic contribution. In their ornamental business an object's utility is of low priority relative to its storytelling and artistry. Furthermore, this artisan uses a material that typically do not translate sympathetically to furniture application. This maker was required to make sacrifices in their submissions' utility in order to produce valid seating object.

5.4.3 Defining Characteristics of Group III

Group III denotes a set of artisans who achieve low utility capability and low narrative capability when utilizing the hybrid making approach. In this research the examples of stools in Group III are Stools 3, 7, and 9. Stool 3's ceramic legs are fashioned in such a way that they intensely showcase the material's narrative qualities with a rough workmanship of risk surface quality and porous, chillingly abrasive touch. This contrasts interestingly with the distributed component in meaning; however, the stool is unstable and therefore not valid due to the spindliness of its supporting members and poor joinery. Stool 7's unnecessarily high seat pan and uncomfortable back plate grant it poor utility, and the design's piecemeal construction and lack of cohesion give it an incomprehensive narrative. Stool 9's unnecessarily high seat pan gives it equally low utility and its unwillingness to make a statement creates a lack of narrative. The makers behind this research's Group III stools are businesses that are not responsible for creating utility or producing narrative in their typical practice. Maker 7 is a small arts and crafts store in a tourist neighborhood that creates some original work but generally made this piece with the help of friends. Maker 9 is a small metal fabrication shop in which design work is not done and utility work is limited to adapting others' engineering directions to the capabilities of the shop. Maker 3 does provide narrative in their typical practice, suggesting the lack of it in their submitted object may be caused by a lack of effort – this is also covered in the thesis' definition of capability as clarified in Chapter 5.4.1.

5.4.4 Defining Characteristics of Group IV

Group IV denotes artisans that demonstrate high utility capability and low narrative capability when using the hybrid making approach. In this research the stools in Group IV are Stools 6 and 8. Stool 6 has great utility as it is sound and appropriately distanced from the ground (and lightweight, though this was not a primary criteria). However, any loosely defined narrative that may have existed when the creator began the making process was intensely diluted from a series of miscalculations, design and craft errors, and apparent lack of care for the finished object. Stool 8 has dependable utility as it is sturdy and also at a reasonable height, even adding the ability to rotate to its utilitarian case; however its simple form, while not problematic, is underwhelming. It is of note that in their interview, Maker 8 suggested they create a wrought iron base if they were to make a second stool, possibly moving them from Group IV to Group I and demonstrating the overall mobility of each artisan's position given the limited data.

CHAPTER 6

DISCUSSION AND CONCLUSION

Chapter 6 examines trends revealed by the research and establishes a foundation for future studies in order to propose new hypotheses about the hybrid making approach. The chapter will begin with a speculative continuation of the quantitative analysis in Chapter 5.4, and conclude with parting thoughts on the research aim, methodology, and the approach's role in the future.

6.1.1 Determining the Impact of the Hybrid Making Approach

Artisans' positions on this same XY grid when using their original, non-hybrid approach were also plotted in order to yield further insight on the impact of the hybrid making approach. These new data points, along with the originals seen in Figure 5.20, create vectors of expected change in utility and narrative with and without the new methodology. The new positions were inferred based on each artisan's existing portfolio as well as their interview responses about how the hybrid object changed their workflow and ability to express capability. As with the original appraisals, these positions are based on the object type used in this research and not the artisan's overall capabilities: for example Maker 4 was assessed based on their ability to produce a stool without the distributed component, not their ability to produce sculptural glass artifacts as they normally do in their daily enterprise.

While inconsistent between makers, each maker did provide supporting data for their original pre-hybrid point. Some data was gleaned from existing portfolios: for example, Maker 1's stool was compared with other stools available on their website, a simple 1:1 comparison. Other data was taken from this research's interview questions: Maker 2 commented both *A ready-made piece set us a beautiful boundary and purpose for finding the right design* and "*the curves brought some difficulties in* *production. But if it had been a flat seat this time, the end product would not have been as impressive"*, demonstrating that their utility capability improved with the introduction of the distributed component. For other artisans whose typical work was more distant from stool production data was less apparent, but still achievable: Maker 7's other decorative wood creations displayed similar aesthetic approach with less recognition of utilitarian requirements. Maker 4, the black sheep in many ways, was located by recognizing a clear understanding of narrative through interview responses in tandem with the low utilitarian capability of their existing, ostensibly utilitarian objects such as bowls and vases. Even in these existing artifacts, Maker 4 also sacrifices their objects' original use cases in order to further their desired aesthetic statement.[7]

The value of the hybrid making process for each specific artisan can be assessed by comparing their objects' locations on the utility/narrative XY graph with and without incorporation of the distributed component (Figure 6.1).

[7] the analysis is an 'indicative evaluation' of the artisan's capability, and not based on a hard dataset of detailed product evaluations.

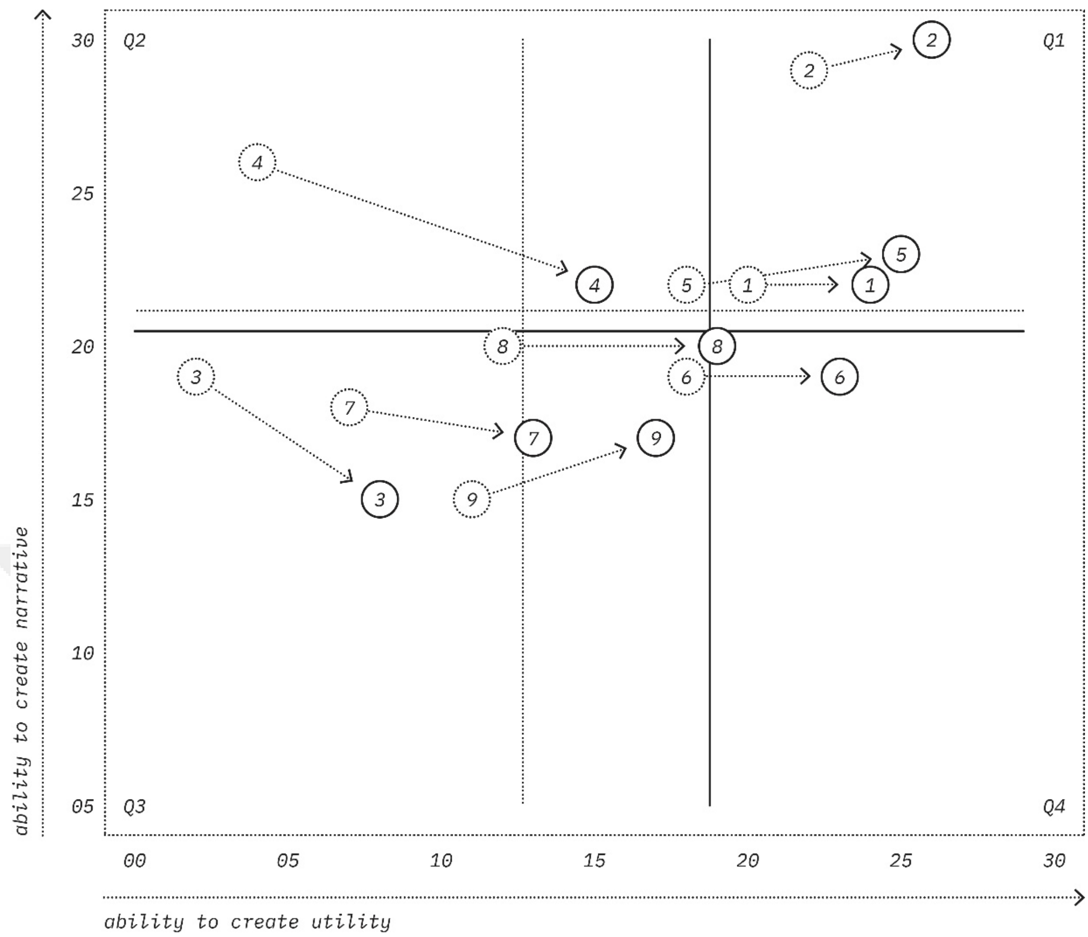

Figure 6.1. Graph showing change between each artisan's standard capabilities and capabilities when using the hybrid making approach

6.1.1.1 How Hybrid Making Affects Group I

Based on the above approach, Makers in Group I were generally capable of improving utility without sacrificing narrative cohesion. Stool 2 uses the seat pan sturdily as a lynchpin of both utility and narrative, Stool 5 creates contrast in material but similarity in curvature, and although Stool 1's physical connection between distributed component and base is clearly ad-hoc, the overall scale and materiality of the object are indeed in response to the seat pan. Maker 1 also specifically admitted this regret in an interview response.

Projects in Group I were made by artisans working within their comfort zone. These makers benefitted from the hybrid making paradigm primarily through convenience. This is because their capabilities make no handholding through distributed artifacts necessary; no nudge towards the right direction is required to be embedded in the mass manufactured components. Furthermore, if the objects are replacing components that these makers were already making themselves, the increased utility probably just saves time: in this project the distributed seat pan's complex curvature could have easily, though slowly, been carved form a solid block of material at the request of any of these makers by simply using a CNC.

6.1.1.2 How Hybrid Making Affects Group II

Group II makers are only able to create viable objects using the hybrid object making approach at the expense of high narrative. Stool 4 is sturdy but ergonomically impractical and less creatively fine-tuned than the artisan's other works. Any requirement of utility capability from the artisan will likely result in an invalid product because production constraints limit the maker from executing successfully.

Group II makers are likely to become Group I makers if a different, more applicable vehicle object is chosen, or if utility is entirely managed by the distributed component. A more applicable vehicle object would be one that is sympathetic to the material and production qualities of these makers, as the stool was sympathetic to the wood of the furniture makers. An example of this alternative vehicle object could be a vase or a lighting product.

6.1.1.3 How Hybrid Making Affects Group III

Group III makers are unresilient to any imperfections of a distributed component due to incapability to produce either utility type, at least given the object type. They are unable to patch utilitarian shortcomings and unable to adapt their design language to narrative leak. Stool 3 does not fulfill basic utility requirements. Stool 7 is a random assortment of design decisions that is uncomfortable, incohesive, and unpleasant. Stool 9 is uncomfortable and shows no effort to provide a narrative in response to or independent from the seat pan. Group 3 artisans are deemed likely to create objects of low utility and low narrative regardless of the quality of the distributed component.

6.1.1.4 How Hybrid Making Affects Group IV

Artisans in Group IV benefit from the utility affordances embedded in the distributed component much like those in Group I: they are clearly capable of creating this utility without the distributed component, but the distributed component may nevertheless provide some convenience in the making process in features that align with the specific advantages of mass manufacturing. Also like Group I, Group IV makers don’t appear to have trouble accounting for whatever utility is not managed by the distributed component itself. Unlike members of Group I, however, who are so capable of producing narrative that whatever narrative is in the distributed component becomes an inconvenience, the makers in Group IV are less likely to produce any narrative with the use of the distributed component. Stool 6 is comfortable, stable, and as a bonus lightweight, but the myriad craft errors and on-the-fly fixes to preventable design issues corrupt what may have originally been a cohesive narrative. Stool 8’s simplicity is welcome, but its indifference towards responding to the distributed component or creating anything of note independent from the seat pan limit its narrative to, if not harmful, uninteresting.

It is possible that this inability comes from a lack of effort, interest, or experience in working with the hybrid system or as a sort of stubbornness towards sharing design agency. The submissions from this group more accurately align with a lack of inspiration or foresight towards the submitted objects’ end conditions.

6.1.2 Inferring General Trends

Four key trends are supported by the experiences of our makers when viewed with this capability analysis approach:

1. Implementation of a distributed component into a local production approach always improves object utility (Figure 6.2).

2. Implementation of a distributed component into a local production approach has a mixed impact on object narrative (Figure 6.3).

3. Higher existing utility capability weakly correlates with decreased utility benefit (Figure 6.4) and moderately correlates with increased narrative benefit (Figure 6.5). This suggests that as a maker's existing capability increases, their ability to leverage the utility benefits of the distributed component diminish while their ability to support narrative increases.

4. Higher existing narrative capability has no significant correlation with either utility benefit (Figure 6.6) or narrative benefit. (Figure 6.7). This suggests that a maker's existing narrative capability has no meaningful impact on their ability to leverage the utility benefits of or create compelling narrative with the distributed component.

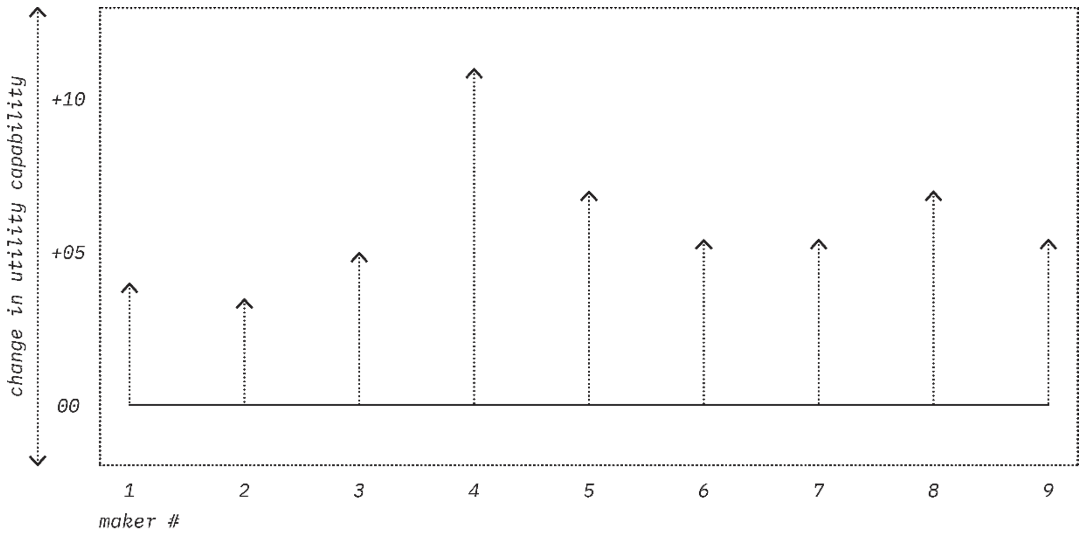

Figure 6.2. Graph showing change in utility capability when using the hybrid making approach.[8]

[8] The information presented in Figure 6.2 can also be seen as the horizontal distance of each vector in Figure 6.1.

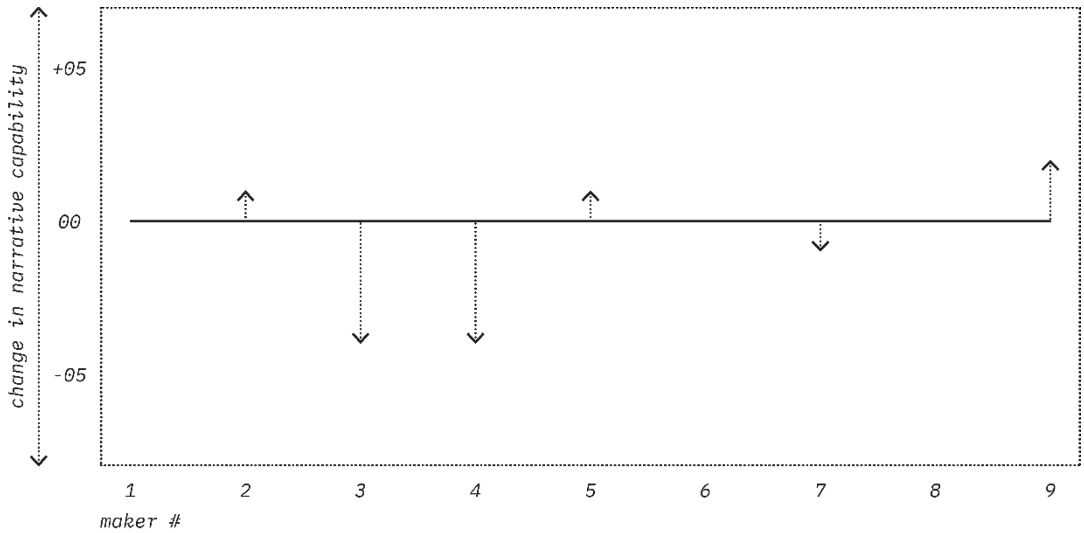

Figure 6.3. Graph showing change in narrative capability when using the hybrid making approach.[9]

[9] The information presented in Figure 6.3 can also be seen as the vertical distance of each vector in Figure 6.1.

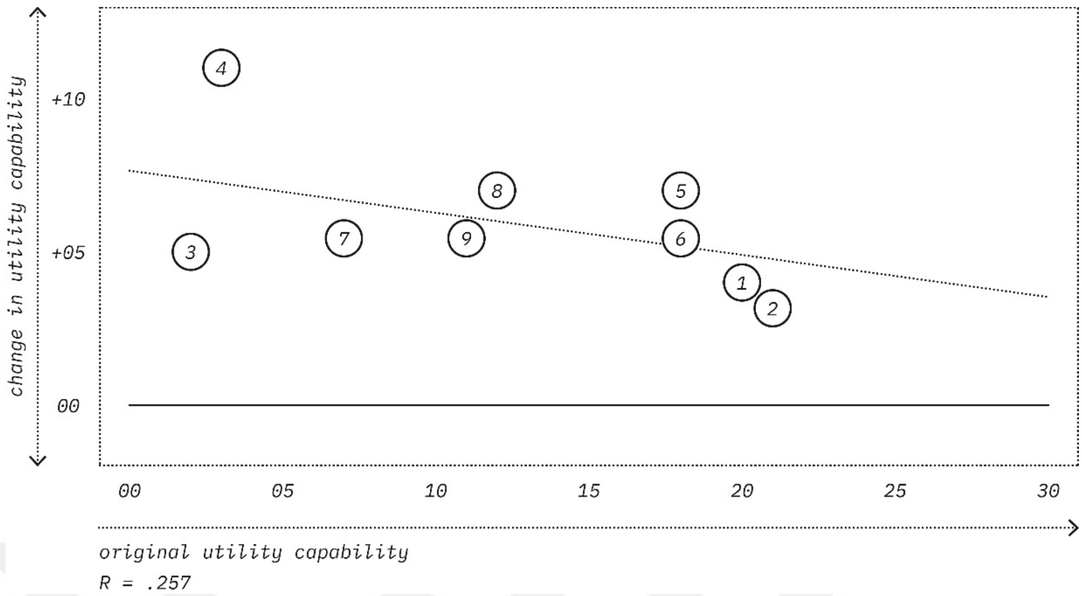

Figure 6.4. Graph showing relationship between original utility capability and change in utility capability when using the hybrid making approach.

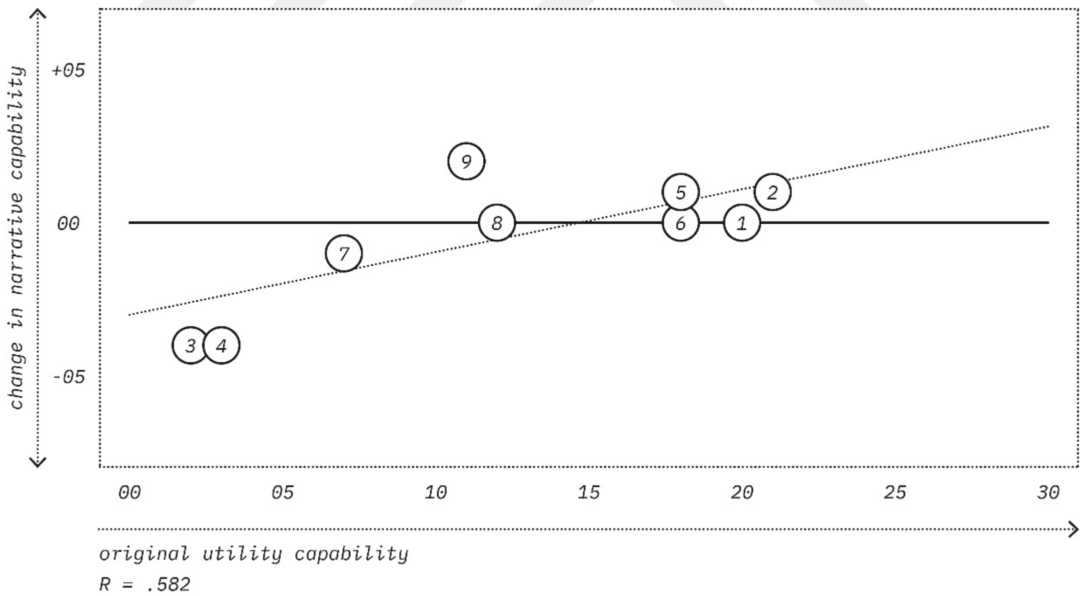

Figure 6.5. Graph showing relationship between original utility capability and change in narrative capability when using the hybrid making approach.

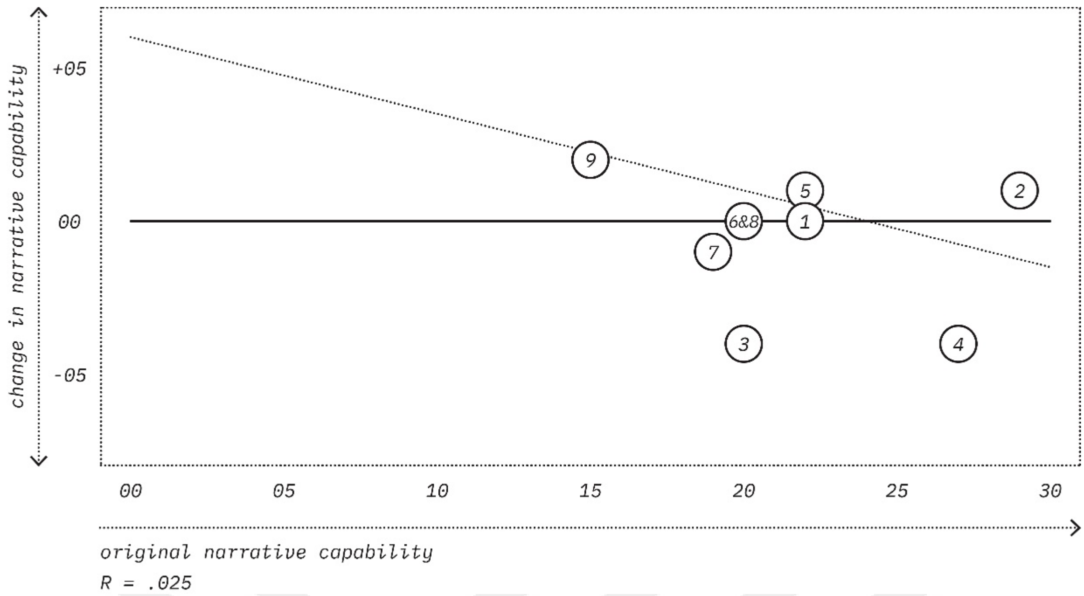

Figure 6.6. Graph showing relationship between original narrative capability and change in narrative capability when using the hybrid making approach.

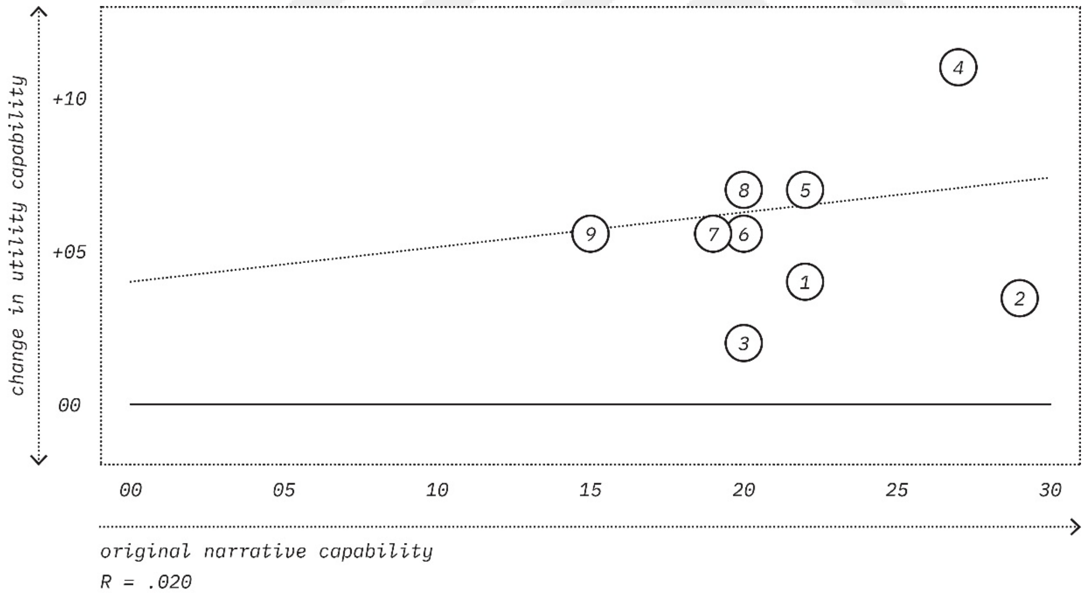

Figure 6.7. Graph showing relationship between original narrative capability and change in utility capability when using the hybrid making approach.

6.1.2.1 Key Insights for Group I Artisans

For artisans whose practices fall within Group I, the hybrid making approach is useful in two ways. First, the distributed component provides convenience, speed, or repeatability to a process otherwise limited by the inherent limitations to the workmanship of risk. Secondly the distributed component may provide improved utility simply through its ability to leverage the benefits of scaled production. Beyond these explicit utilitarian benefits there are no others observed in this research: Group I makers depicted incorporation of the distributed component's narrative as a hassle and as off-brand and are clearly capable enough to create objects with more maker-specific narratives if given full control. It is therefore only the utility of the distributed component that is begrudgingly accepted despite the sacrifice to potential narrative agency.

For makers in Group I, distributed components are best when they are at their hybrid making paradigm ideal - affording all capability while contributing no narrative. This allows the artisans convenience in their making process by improving speed of production, ease of assembly, and mitigating workmanship of risk in structural areas. Simultaneously the ideal distributed artifact would free the artisans by allowing them to create any narrative they chose, a skill all creators in this Group have worked to cultivate within their area of expertise. Group I artisans are resilient to poorly designed distributed components (based on the criteria outlined in Chapter 4.1) but may be unwilling to accommodate them given their general capability to create good objects outside of the constraints of the hybrid paradigm.

Group I artisans will likely accommodate utilitarian shortcomings of distributed artifacts if they save time and are easy to mitigate through their standard production practices. They may not be so forgiving of the distributed component if it leaks enough narrative to restrict the stories the maker is able to tell: in this case the decision of the artisan to adopt the hybrid making approach will be a measure of the utilitarian conveniences against the limitations of accommodating whatever narrative comes along with them. They are able to accommodate a distributed component's narrative leaks, but may be unwilling to do so if the distributed component's total utility does not save time or if the narrative instilled in the distributed component conflicts with the maker's brand identity or desired object.

Distributed components for Group I should prioritize narrative silence, even if utility is slightly sacrificed, because makers in this user group can dependably detect and resolve these utilitarian shortcomings. Distributed components for this group may also from focus on utility affordances specifically created through scaled production processes.

6.1.2.2 Key Insights for Group II Artisans

Artisans whose work falls within Group II are resilient towards narrative leaks in the distributed component because they are as capable as Group I makers of storytelling through objects, however, these artisans are unlikely to voluntarily dilute their own narrative ambitions because these narratives are the primary value add to their existing practices. This is also because even with the utility afforded by the distributed component providing a sizable boost, these Group II artisans remain unable to bring utility to a healthy position. Therefore, despite the ability to salvage unintended narrative from the distributed component, the final objects remain underachieving as utilitarian objects.

There is a possibility that a fringe group exists between Groups I and II where the utility afforded by the hybrid making approach makes the difference between successful and unsuccessful final products, and that by chance none of the nine makers in this study inhabit that space. This hypothesis is represented in Figure 5.22 but would require future research to confirm.

Artisans in Group II can benefit from the hybrid making approach so long as they can successfully patch the gaps in the vehicle object's utility. This proved to be a tall task for the Group II artisans in this study. However, due to these two artisans' limitations of effort and time, this insight is far from comprehensive. Distributed components for Group II should make sure to complete utilitarian criteria entirely so that artisans in this group explored in Chapter 5.4.4.2.

6.1.2.3 Key Insights for Group III Artisans

Data suggests that the hybrid making approach is unable to support artisans that cannot achieve basic narrative and utility in the designated object type with or without the hybrid making approach. Artisans in Group III may gain some utilitarian benefit from incorporating a distributed component into their designs, however, they are less able to accommodate the narrative based on their existing low narrative capability. The objects made by Group III participants, with or without the hybrid making approach, are unlikely to be useful or pleasurable because of their lack of expertise for the given object type or experience in general.

6.1.2.4 Key Insights for Group IV Artisans

Artisans in Group IV cannot be helped significantly by the hybrid making approach because the distributed component offers no benefit to narrative quality (Figure 5.23). Objects made by artisans in this area may marginally improve in utility with the incorporation of the distributed component, however, they are unlikely to ever achieve a positive narrative score because they do not possess the ability to manage the existing narrative of the distributed component. Whatever utility is afforded by the distributed component is redundant due to the artisan's existing capability to produce utility.

Distributed components designed specifically for Group IV may indulge in a bit more of a narrative resolution, even if utility resolution is left for the artisan, because these creators show express ability to complete objects with soundness but may benefit from a prompt for form completion.

6.1.3 Supplementary Visual Analysis

Furthering the graphical analysis in Chapter 6.1.2, intermediary points can be added to the utility / narrative matrix in order to estimate the likely effect of hybrid making on an artisan of any existing capability. of the research data is limited in objectivity and in trustworthiness due to the small number of participants and distance created through the layered analysis from the objects themselves, however, these supplementary visualizations do suggest new opportunities for the development of the hybrid approach and are therefore included in this thesis. Figure 6.8 shows the direction and amount of change likely to be seen from any given artisan when using the hybrid making approach.

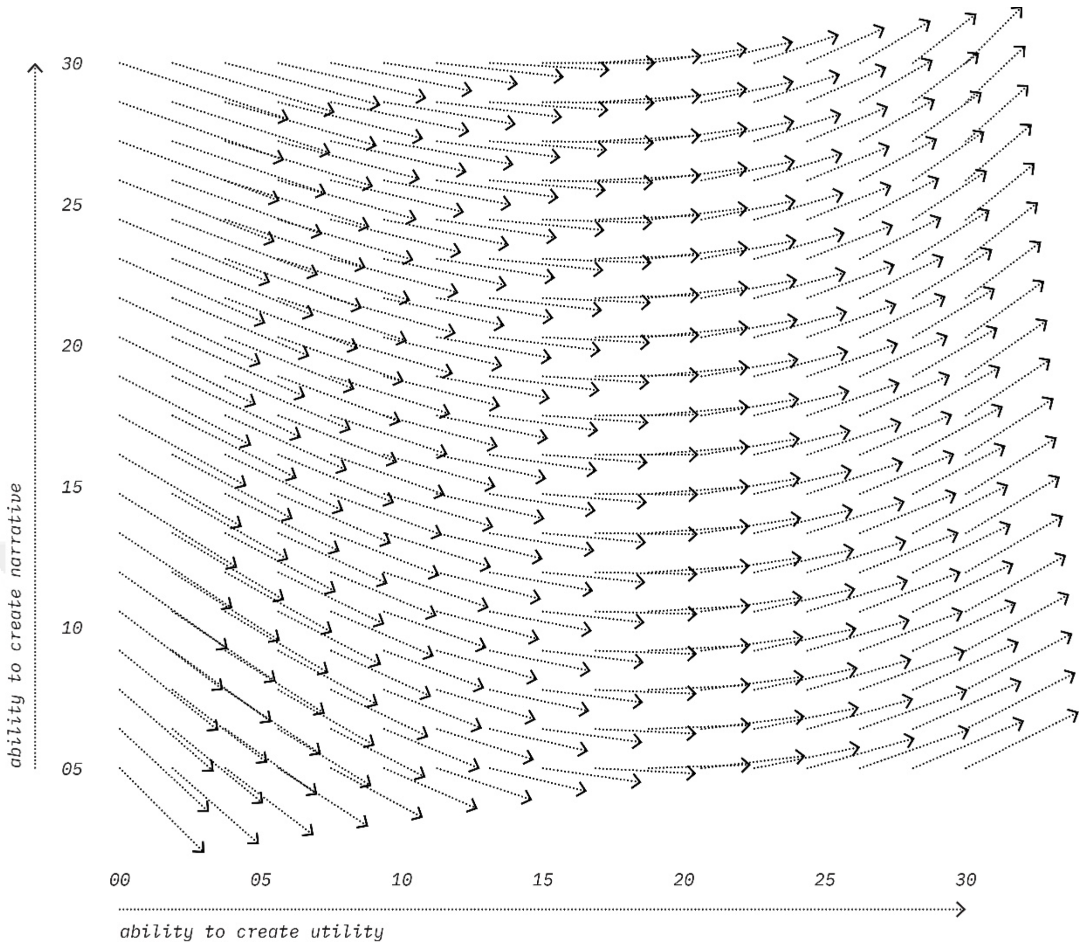

Figure 6.8. Visualization showing estimated artisan locations with and without using the hybrid making approach

6.1.3.1 Locations for Future Studies

Does the hybrid making approach show any potential for market success against existing paradigms? In some cases, yes. The researcher sees two main communities that may benefit from future studies with more specific aims and methodologies, demarcated in Figures 6.9 and 6.10:

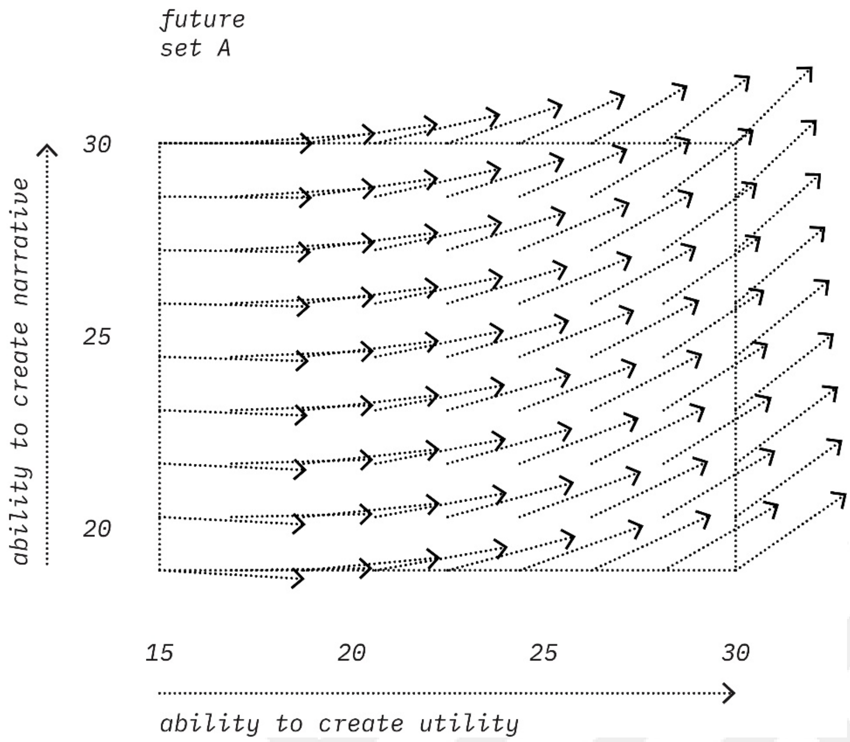

Figure 6.9. Visualization showing Future Set A

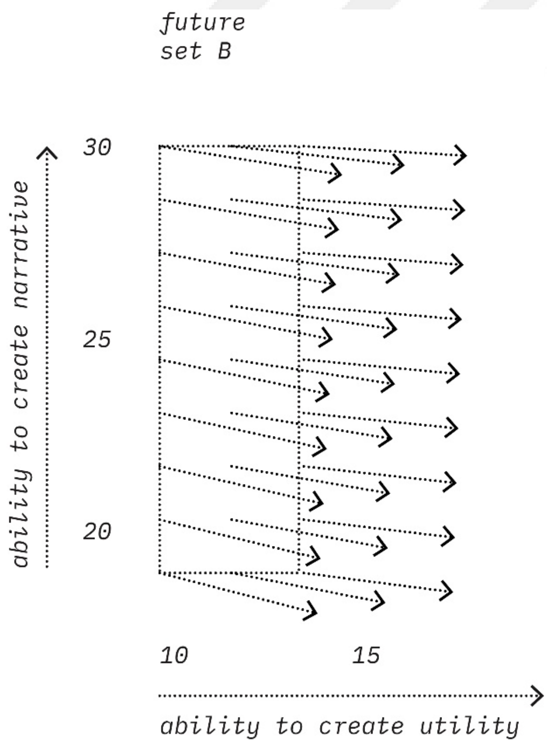

Figure 6.10. Visualization showing Future Set B

The first of these two sets is the experts in the object type's category, roughly equating to this research's Group I, hereby referred to as Future Set A. Future Set A consists of the artisans that are already making their own versions of the object type before incorporating the hybrid approach: ceramicists making bowls, weavers making carpets, and furniture makers making stools. The analysis in Figures 5.20 and 5.21 show that in the top right quadrant of the graph the addition of distributed components always increases utility while often increasing narrative capability, meaning that in this case the aim of the hybrid approach in this context would be to help these artisans create the best products possible.

Future Set B consists of artisans who have high narrative capability but are just on the fringe of utilitarian validity. In this research, none such makers are represented, though perhaps Maker 4's glass stool or Maker 8's black metal stool would be closest to this section. The makers in this set would be using distributed components to create object types that are just slightly outside their standard expertise: hypothetically this may include the same ceramicist making a coffee dripper, the same weaver making a pillow, or the same furniture maker making a floor lamp. For this user group, the hybrid making approach may afford the final utilities that could not be managed by the artisan for these adjacent projects, and therefore expand their portfolio. While the weaver's pillow may not achieve the utility and narrative capability of an upholsterer's equivalent, the object would potentially still be valid in itself and contribute to overall diversity within the object type.

6.2 Examining Trends in Key Hybrid Features

The data acquired through this research process makes clear the broadness of the original research question by showcasing a variety of advantages and limitations implicit within the hybrid making approach in the Turkish context. Answering the original research question of whether or not the hybrid making approach has potential in the Turkish context cannot be answered with confidence. Some goals are clearly achieved, others are clearly not, and between these two poles sits a variety of muddy topics with no clear insight to be gained without further research.

Some overall consistencies can be derived from the research presented in this thesis. Primary points of interest are object diversity, object utility, object narrative, and locality.

6.2.1 On Object Diversity

To begin with the clear successes of the hybrid making, it is apparent that the stools submitted by the artisan participants possess a high level of diversity within themselves and as a group. The hybrid object approach, in terms of combatting the built world's homogeneity, is successful.

Diversity in object narrative was naturally high because artisans all approached this project with different backgrounds and with different intentions. It is easy to imagine nine trained designers submitting a similarly varied set of concepts, so the diversity in ideation is not unique to this hybrid approach. The narrative diversity in this research, though, is realized in real objects rather than just concepts. Therefore it is likely this narrative diversity is made possible through utilization of craft making as a production technique (as opposed to mass manufacturing) more so than it could be attributed to artisan's mystical form-giving imagination.

Diversity in utility creates an interesting paradox by creating loads of variation where it may not be welcome. The utility responsibility left to the artisans was often squandered, at least from a design perspective: even when only in charge of setting the height of the seat pan and making the object stable, many of the participant artisans did not execute. The artisans that created comfortable stools all installed the seat pan at similar heights, showing there was a single ideal height and that finding it was more of a task than a matter of invention. Apparently many artisans saw the seat pan height as another opportunity for self-expression more so than a design constraint. This non-designerly approach to objective, measurable ease of use may be the cause for the diversity itself: as ID uses measure, logic, and a somewhat empirical approach to solve utilitarian problems such as this one, many of the artisans are clearly unintimidated by constraints and therefore are likely to create to a wider range of possible objects based on the use case (for better or for worse). Perhaps this diversity in utility is unwelcome, though: while a wide variety of object narratives provides each individual user with an opportunity for self-expression, a variety of utilities creates some objects that are simply worse at fulfilling their intended job. After all, when one of these stools is taken home, it is no longer enjoyably diverse relative to its family members because its family members aren't providing contrast in context. This logic confirms that future hybrid making studies may find value in focusing on expanding narrative diversity while constricting utility diversity (as hypothesized in Chapter 4.2.1).

As individual objects, Pye's definition of diversity within an object is certainly achieved by each of the submissions because the contrast between the workmanship of certainty embodied in the distributed component contrasts so greatly with the workmanship of risk embodied in the artisan completions. Regardless of the quality of the submission, each piece successfully remedied Pye's single gripe with mass manufactured objects, that they produce no diversity at the detail level. This insight may serve as a foothold for future studies where the role of the craftsman is restricted to merely the responsibility of contributing this diversity - one is inclined to believe such an approach would reduce the utilitarian variability between objects but may also reduce artisan shortcomings. The hybrid making approach is a viable method for increasing diversity within an object and within a world of objects because it leverages craft makers' production capabilities and ideological non-designerly approach.

The similarities between Stools 8 and 9 must be addressed: while clearly different in application and in workmanship, differences in design concept are limited. This casts doubt upon the theoretically endless diversity that could be unlocked through hybrid making by suggesting only a certain number of reasonable responses to any given distributed component are reasonable.

6.2.2 On Object Utility

A handful of submissions successfully created appropriately utilitarian seating objects by incorporating the distributed component at an appropriate height from the ground at a comfortable angle and with reasonable sturdiness. This being said a shocking number of the nine artisans failed at this task: Five of the nine participants scored a 3 or below in "ease of use" based on the individual object researcher appraisals in Chapter 5.3, a surprise for a category that was expected to have been foolproof by the researcher. The seat pan's curvature was hypothesized to be the challenging design aspect of the utility in a stool, and the height of that object from the ground was not expected to be problematic whatsoever. It has confounded the researcher that so many participants were unable to execute a basic ergonomics task. This observation supports a conclusion that the participating artisans were not capable of leveraging the hybrid making paradigm because they were not appropriately skilled or trained in utilitarian object production, and may only approach this kind of problem heuristically.

This inability for some makers (in Groups II and III) to accommodate small gaps in a distributed component's utility is mutually exclusive with any potential in the hybrid making approach. This is because if artisans are not able to create any utility, the distributed component would need to carry all the utility, and therefore be a final object before the contributions of the artisan. Objects like this exist to some degree already: lamps work without lampshades, and plates work without painterly glazes. The researcher had hoped the hybrid making approach would elevate these systems by granting the artisan more agency, however this hope remains unfulfilled.

Some comments from the comparatively more capable Group I makers suggest that despite being a little more difficult to incorporate than their own designs, the objectively successful ergonomics embodied in the distributed seat pan component improved the comfort of the final object. This is reason to maintain a bit of optimism because it indicates that in cases where a maker is highly skilled, production limitations may still afford better parts by utilitarian metrics than whatever can possibly, or reasonably, be produced within the original production limitations of the artisan. This objective quality improvement may be true for all stools and only mentioned by those insightful enough to comment upon it. Even if it were true, though, it would only be beneficial to artisans who are already capable of affording some amount of utility without the distributed component.

Artisans' willingness to contribute meaningful objects must also be noted at this point. Despite enthusiastically opting into research participation, many creators clearly favored low effort, timesaving strategies when making their stools for this reason. These objects may not be true indications of the artisans' capabilities. Utilitarian criteria that require time intensive prototyping to discover may have not seemed worthwhile to the participants who figured they could reckon the appropriate height without wasting real business time. This is an unknown variable that would need to be researched further, perhaps with a different set of incentives for the makers than what was offered for this study.

6.2.3 On Object Narrative

It's impossible to say if the inclusion of the distributed component in the submitted objects constricted or diversified the narratives in each stool submission. Data is inconclusive on this point. On one hand having the first chapter of a story written already inherently limits possible outcomes. On the other hand, while a smaller number, the set of possibilities within this constraint remains huge. Narrative leaks in the distributed component may have hamstrung artisans' range of possibilities, but they may have also served as a prompt to which each artisan could respond with a creative foothold.

Regarding narrative quality, the makers who produced the most cohesive and potent stories within their submissions were the ones who approached the project most humbly. As the most cohesive, Stool 2 celebrates the top by providing it a pedestal of equal and simultaneous contrasting beauty. Near the middle of the spectrum Stool 5 uses the distributed component as a backdrop with which to, ironically, support the flamboyant curves of the base. Further down the line Stool 7 seems entirely blind to the seat pan component apart from a single incorporated curve on the steel plate below it, and finally Stools 8 and 9's makers appear to have designed their final submissions with no desire to respond to or accommodate the design narrative instilled in the distributed component whatsoever.

Despite their failure to produce any utility, Stool 3's makers provided an insightful analogy for the unique challenge of this task. This response concisely and poetically shows their approach to completing a distributed component's story:

What benefits and challenges came from using the scale-produced part?

Working with a ready-made piece is like a one-lane road to a certain emotional space. Many things you see on that road can be included in the design, which allows you to see more on a narrow road while restricting other options.

Approaching the narrative completion as a shepherd rather than a leader is a graceful and sympathetic approach that clearly worked well for Makers 2, 3, 4, and to an extent, 1. This design-as-you-go, call-and-response style of form-giving might be a similar process to the bottom-up making processes already employed by these artisans in their existing production processes. Potentially undermining the hybrid making approach is the unconfirmed suspicion that if a designer is good enough at narrative creation to overcome this roadblock, they are likely good enough to design (if not manifest) valid objects without the help of distributed components at all. Conversely, the utility afforded by the distributed component may be enough of a head start that the maker is incentivized to create something new and unique that otherwise would not have been made.

6.2.4 On Locality

The hybrid making approach as studied in this thesis raises several questions about the role of locality, the value of that role, and that role's place in scaled production of any form. Because the hybrid making approach has only been examined within the Turkish cultural context, it is impossible to certainly discern characteristics of Turkish locality relative to locality in general, however, a few assumptions can be made regarding which insights apply to Turkey and which apply to hybrid making in general.

The research insight shows the hybrid making approach does effectively inject locality into objects with primarily global utilitarian features via distributed components. Each submission leverages the conveniences of local production without necessarily deliberately attempting to display them. This is done in several ways including using local materials, employing workmanship of risk methodology, reducing top-down design goals, and dynamically responding to immediate circumstances like material and time availability. These innate, implicit benefits of local production are employed almost naively by the artisans of the study because they are the backbones of their respective enterprises. When responding to a distributed component in the hybrid making approach, artisans maintain their typical making strategies rather than trying to mimic (in process or in appearance) the mass manufactured nature of the given part.

Uniquely Turkish insights are hard to confidently untangle from overall trends. Some makers (1, 2, and 3) operate their businesses based on taste and internet driven marketing, encouraging similarities to global brands. Other makers (6, 7, and 8) are embedded in the Turkish system of small shops and makers that exist as a community and collaborate to create finished objects. More research is necessary, preferably in other cultures, to explicitly understand the relationship between hybrid making in general and in the specific Turkish context.

The researcher hypothesizes that whereas in countries like America or England the designer-maker role is common, that business model is still in its infancy in Turkey. Individuality, authenticity, and production narrative are strong societal trends that support the small independent design shops in these other places, trends that some makers in this study (1, 2, and 3) attempt to capitalize upon here in Turkey. However, the other participants often lacked internet presence or interest in deliberate design work as part of their practice. The lower prosperity and income of Turkish workers compared with western countries may also explain the relatively underdeveloped designer-maker sector and, hence, the difficulty in securing artisan participants for this research who were happy to take on design responsibility. It may not be a coincidence that the first of the more 'western-leaning' makers is based in Istanbul, the second in Izmir, and the third, though in Ankara, has attended several European design events in the last year. Perhaps these communities better mimic the western individualistic ideology where objects are not only about their material affordances, but also about what they say about the individual that owns them (beyond ability to financially afford the object).

Even more broadly, it might be said that whereas the existing designer-maker shops of the West create value through deliberate (even arbitrary) individuality, the adjacent Turkish atölye might instead create value through effective reproduction. Explicitly this may mean effective production of replacement parts or seamless repair work. Implicitly this may mean preserving traditional tacit knowledge and its deep connection to Turkishness. If this were true, the differences in likely outcomes of research such as this would be no surprise.

6.2.5 On Agency

Working with an overseas manufacturing company to produce the seat pans was the first notice of a budding theme of *control* within the stools' parts. This idea of control, or agency over the final form of the object, appeared in this process for the first time as another fascinating difference between mass manufacture and local making. Before embarking on this RTD process the designer expected that the mass-produced parts in these hybrid objects would be the ones where they were able to exhibit the most control, showcasing the precision and repetition made possible by manufacturing in multiples. However this was not as clear-cut as expected, showing that whoever has their hands on the final product itself will always have the final say over an objects' condition whether they work on a production line in southeast Asia or in an atölye in Ankara.

When discussing materials, finishes, and hardware components with the prototyping company, the company was clear to ask the preferences of the designer - reference images and standard parts were used where possible, but ultimately the true look and feel of the final object is somewhat defined by the anonymous factory production engineers and workers. This process showed the researcher that when working with a company so different and so far away, with such different motivations, small details will inevitably be lost just as they would be when working with a designer-maker. What if the engineer chooses to place the parting line in a frustrating location? What if the floor worker uses a not-quite-correct coloration by accident, or feels obligated to use a slightly expired resin? What if two people are in charge of polishing the units, and one person is better at their job than the other? How much time and labor would be lost in trying to fix these issues as they arise, or perhaps even harder, predict these issues before they manifest? While the researcher notes this concept of control is far from perfect at the local craft scale as well, the differences in what can and can't be reasonably defined by the form-giver became an unexpected insight in the overseas manufacturing experience.

In addition to *control*, a theme of *quality* also emerged. That is, even within a single manufacturing paradigm, opportunities to succeed or fail within those parameters are plentiful. The ergonomic shortcomings of these seat pans cannot be attributed to manufacturing capabilities, qualities, or opportunities - those all welcomed these forms with ease. Instead, this seat pan's discomfort can be attributed to a lack of works-like prototypes, limited experience with seat pan surfacing, and a reduced timeline: all conditions that exist within industrial design. While not groundbreaking, this theme of quality is important to note; even though these hybrid objects will initially be about the unity of two paradigms, the quality of both parts is still essential to creating a lovable object.

Similar to the experience of the distributed component designer, some artisans also expressed frustrations with the lack of agency in the process. Though, like all artisan experiences, no opinion on this point gained majority.

6.3 Insights on Experiment Design

While the research methodology of this project did reveal rich insight, several changes would improve future researcher's abilities to achieve meaningful results. These changes are generally based on a better understanding of artisan incentives and identities, while a few are simply practical.

6.3.1 On Designing the Distributed Component

Encouragingly for both future research and market validity, designing the distributed component was very similar to designing a whole object, the main challenge being only that the narrative impact of the distributed component was to be as insignificant as possible. This challenge is also apparent in some existing products, though: many household consumer electronics such as televisions and speakers deliberately try to mute their narrative in order to adapt the feelings of whatever content is being shown through them. Overall the design process supporting the distributed component was in line with traditional industrial design practice, and existing industrial designers are likely to be able to create effective distributed components with existing expertise.

Despite its size, the stool was an effective vehicle object type. Vehicle object criteria outlined in Chapter 4.1 proved to be effective, though perhaps more emphasis on leveraging the explicit benefits of scaled production (rather than scaled Industrial Design) would be appropriate to incorporate. The hybrid stool's seat pan was designed by Max Plummer, the graduate student conducting this research and an industrial designer by trade. Max has held full-time junior and senior industrial design positions and holds a degree in industrial design. Whether good or bad at his job, Max is qualified to call himself an industrial designer and therefore qualified to represent the industrial design paradigm within this research project.

6.3.2 On Working with the Artisans

More important than a craftsperson's *ability* to achieve good workmanship is their *willingness* (Pye, 1968). Originally the methodology used for this research incentivized artisans through prestige: a contribution to Turkish crafts culture, academia, and an exhibition at METU's faculty of architecture, as well as the stool returned to the maker after the project. The researcher, while allowing a budget for materials, explicitly did not provide financial compensation for work so that artisans would not be tempted to take the fixed price and produce low quality objects for the sake of profit. It was thought that in tandem these parameters would self-select craftspeople that were both interested in academic contributions and incentivized by the notoriety that would come along with the exhibition. It's likely this is somewhat true, but the objects received show other incentives and obligations that colored artisans' interest in the project.

For unknown reasons, several of the returned stools have clear effort-driven instances of bad workmanship (poor welding seams, inconsistent surface finish, etc.). The designer hypothesizes that because most artisans were found through personal introductions or social requests, many participants felt socially obligated to contribute a stool despite feeling apathetic towards the project itself. The research team, composed of an American and a Brit, did not foresee this social obligation as such a hindrance to opting out because it may not have been so socially powerful in the researchers' native cultures. Most friend-of-a-friend connections accepted participation, and every cold open storefront introduction accepted participation as well. For a community of workmen, the workmanship of the objects was surprisingly low. This may be solvable with more culturally sympathetic research methodology.

Deficits or disappointments in the quality of the *design* of the artisan submissions is likely attributable to the designer assuming individual makers would desire more creative agency than what actually ended up being true. This embarrassing indulgence in the Morrisian craftsmanship ideology (outlined in Chapter 2.2), along with a natural disposition as designers to enjoy creative agency, likely colored the perspective of the researcher in such a way that other preferences were not considered when designing the experiment. It is also possible that generally the 'correct type' of artisan did not participate in this project; nevertheless, some participants did better mimic the artisan communities in the researcher members' home countries and responded well to the creative agency offered by the methodology. The variation in the 'type' of artisans and their response to the hybrid approach is indicated by the four-quadrant analysis in Chapter 5.

6.3.3 On Object Analysis

The stool appraisal in tandem with the questionnaire and written interview proved to be a helpful, dependable information acquisition methodology. Artisan submissions were able to objectively represent the process of their makers, providing an unbiased perspective on and apparent success metric of the making process behind them. Artisan interviews, despite language and technology barriers, proved integral to understanding the thought processes (and the surprisingly diverse approaches) the participants used to justify their objects. When seen as a pair, the interview and submission data were sufficient to observe notable patterns and reveal theories behind utility and narrative that may serve as a foundation for future research.

Collective graphical analysis of the submitted objects provided helpful new insights despite a lack of multiparticipant appraisal data. Splitting evaluation criteria into utility and narrative groupings proved to be a helpful, honest method to evaluate artisan contributions to final objects. The researcher hopes this thesis inspires other endeavors to add to the collective data pool to more comprehensively illustrate overall trends in the hybrid making approach.

6.3.4 Design Guidelines for Future Hybrid Making Studies

The design methodology outlined in Chapters 3.2 and 4.1 can be used as a starting point for future distributed component design tasks. Disregarding the extent to which the seat pan part achieved the goals outlined in those sections, the artisan submissions supported the assumptions in these sections that at that time were hypothesized based on secondary research. Supplementary considerations revealed in the research may include anything that specifically reduces the narrative leaks apparent in the distributed component; see Figures 6.1 and 6.2, in which a revised distributed seat pan component concept is suggested, with new features. The rough white plastic is less provocative than the clear gloss finish of the unit used in this research. The separate shroud hides distracting connection features. The two big circles are scrapped in favor of a four-leg affordance.

Figure 6.11. Seat Pan: Generation II Concept in context

Figure 6.12. Seat Pan: Generation II Concept in context

For artisans in Future Set A, distributed components may prioritize features that are specifically afforded by mass manufacture, rather than prioritizing objective design features' forms. These makers are already experts in ergonomics and similar form-based objective design criteria and are able to manage them in-house. It is only the convenience of these features that are valuable. For artisans in Future Set B, a distributed component's objective design features would be equally as important as the mass manufacture affordances because these artisans would have less experience with the object type and therefore less understanding of how to achieve appropriate utilitarian quality.

6.3.5 Artisan Guidelines for Future Hybrid Making Studies

For an unknown reason, many artisans did not utilize the documents given to them with their invitation to join this research project (Appendices G & H). This is known because the researcher was asked several questions in the months between seat pan distribution and stool collection for which the answers were included in these documents. Other artisans asked for more information on the distributed components when asked what they'd change about the process in the interview at the end, further diversifying this behavior.

The data in this research does not offer insight as to how to better communicate with artisans beyond the simple advice to make the process as simple as possible, and as quick as possible to understand. This is ultimately what the researcher did by using photos and simple language in the distributed documents, however, data suggests the extent to which the researcher achieved these goals was insufficient. Like all artisan behavior in this research, puzzling shortcomings in capability and participation may be tied to unwillingness or inability to sincerely participate. As an academic research study, the collaborations with artisans were required only to be authentic, regardless of success; in an industrial implementation however, a properly incentivized and productive relation with artisans would be necessary. Artisanal work is inherently personal to the maker – their personalities and their personal values or opinions are intertwined in their creative practices. A productive relation with artisans requires awareness of these factors, as well as a strategy to deal well with them.

6.4 Closing Remarks

> *"At the present moment we are more fond of the ingenuity than the qualities. But without losing the ingenuity we could, in places, still have the qualities if we really wanted them." (Pye, 1968. Pp. 8)*

Exploring something new instead of clarifying something old yields mixed results. This research methodology took nine shots in the dark based on an unproven concept, and the returned objects reflect the unknown unknowns of this gambit. Many submitted objects show more frustrations than benefits to the hybrid making paradigm, and the overall family of research objects suggests that in general the approach is unhelpful in some scenarios. However, the nine shots taken by the researcher went in wildly different directions in order to give the new approach the best chance to show promise.

From those nine shots, a handful of interesting insights and some promising results indicate a potential future for hybrid production because the benefits seen are unique to this making approach. Unity in narrative realization, improved utility, eased artisan labor, and object diversity all emerge as key benefits worth exploring in future hybrid making endeavors.

Although the research objects in this study do not entirely replace the convenience of mass manufactured objects nor the narrative purity of locally made ones, the compromise inherent to the objects was always to be expected in the results and insights. It will be the responsibility of future research to understand the value of these hybrid objects against typical versions from existing paradigms. The unique benefits of the compromise though, in the opinion of the researcher, do hold enough potential that the hybrid making approach is worth researching further in order to continue to reveal the benefits of the new making approach. This research's findings create a path, albeit a long and narrow one, towards encountering simultaneously utilitarian and culturally sympathetic everyday things in everyday life.

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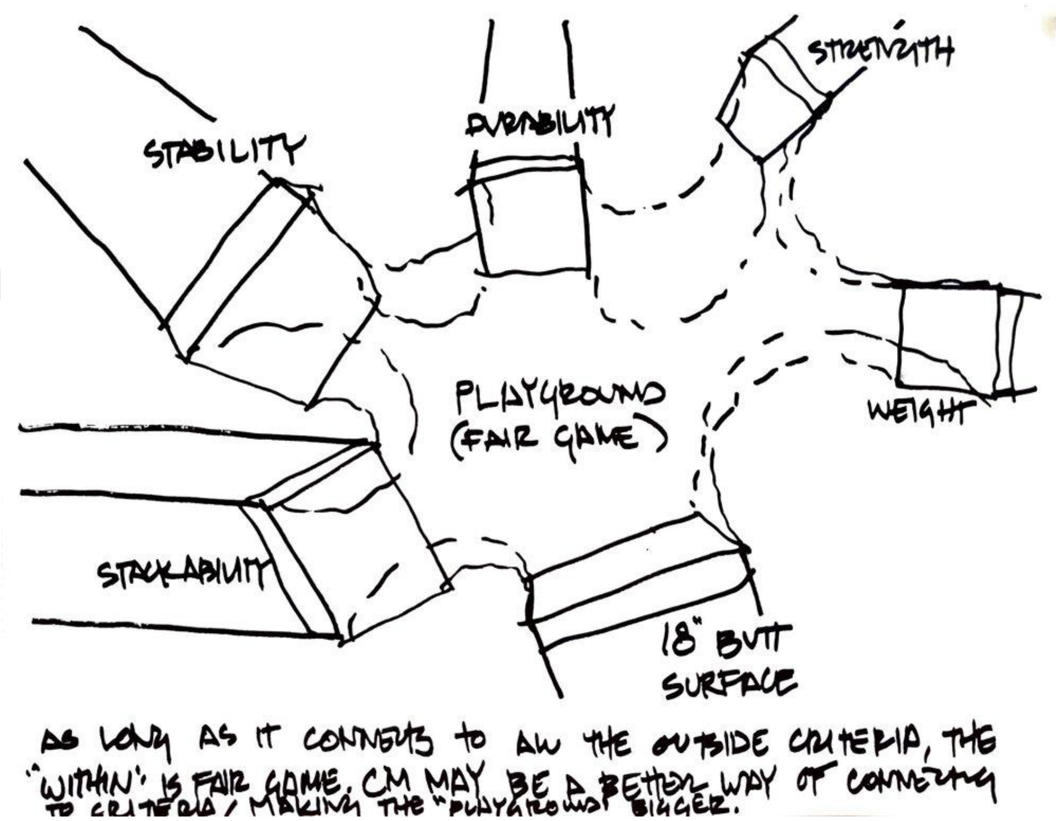
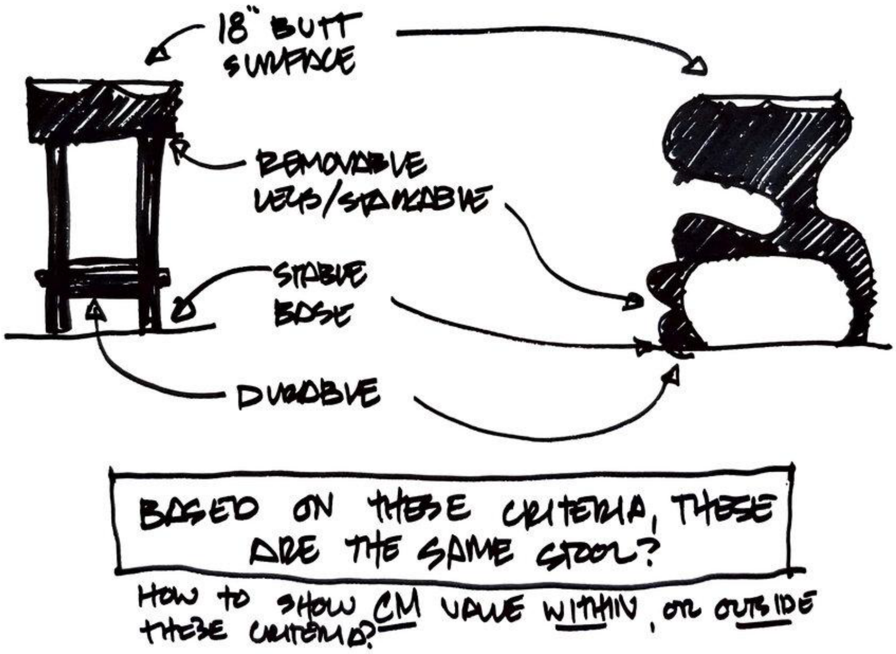
APPENDICES

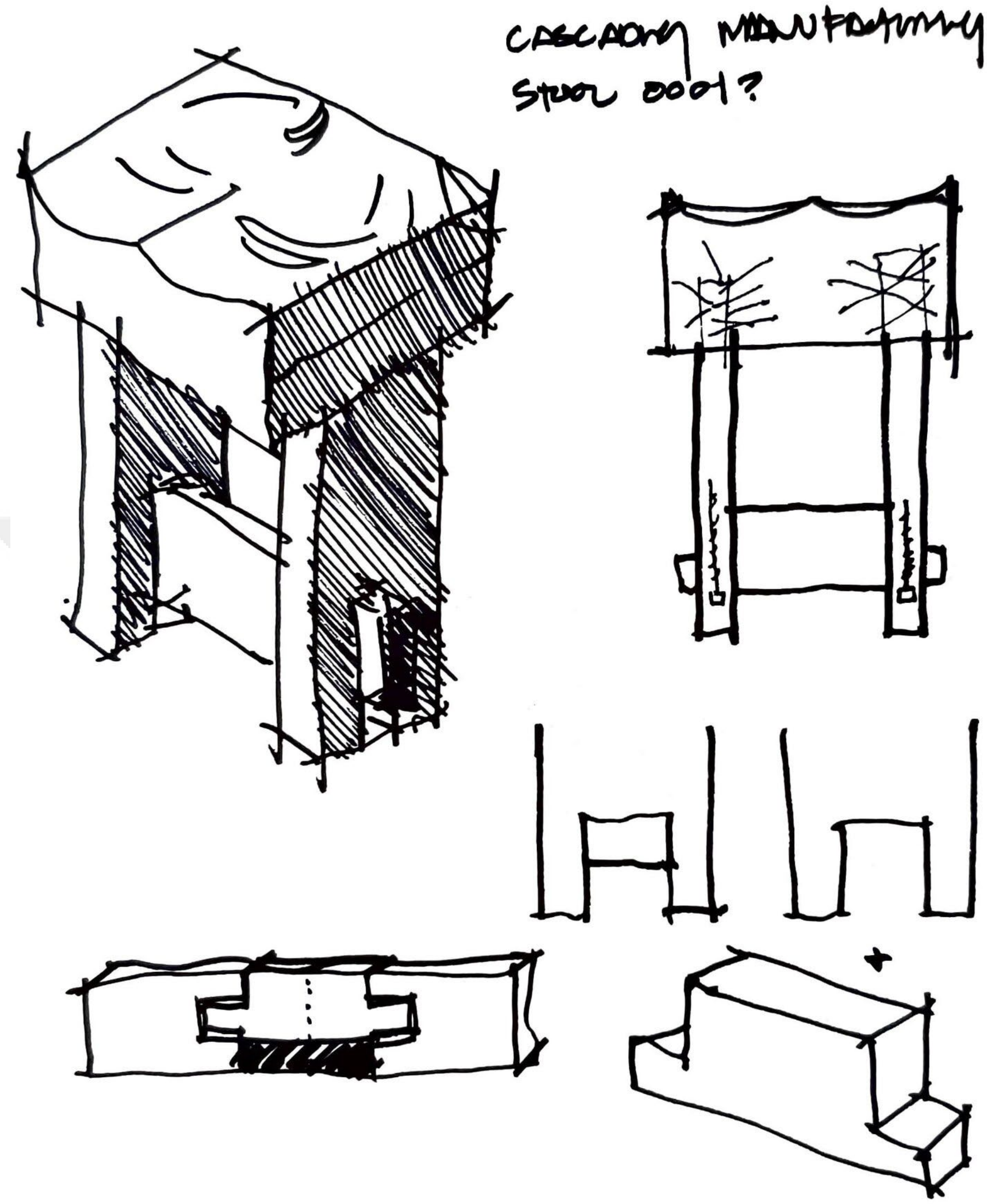
A. Selected Preliminary Sketches



sketch of solution space for hybrid interventions



sketch of solution space for hybrid interventions



sketch of a stool using cascading manufacturing tolerances

B. Selected Preliminary Stools

Preliminary Stool 1

Preliminary Stool 2

Preliminary Stool 3

Preliminary Stool 4

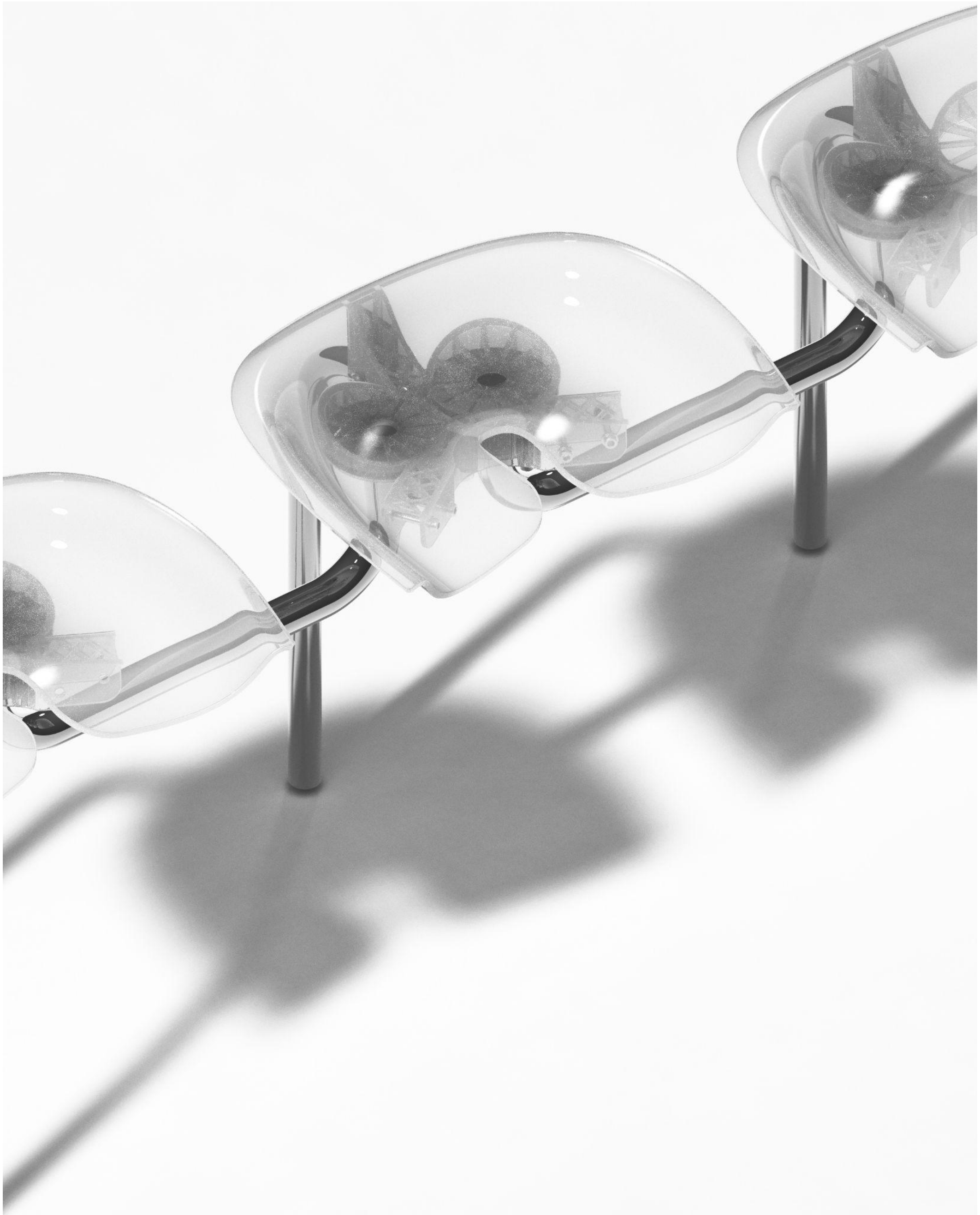
Preliminary Stool 5

Preliminary Stool 6

Preliminary Stool 7

Preliminary Stool 8

C. Selected Demonstration Stool Concepts



Demonstration Stool Concept 1

Demonstration Stool Concept 2

Demonstration Stool Concept 3

Demonstration Stool Concept 4

Demonstration Stool Concept 5

Demonstration Stool Concept 6

Demonstration Stool Concept 7

Demonstration Stool Concept 8

D. Seat Pan Production CMF Document

seat pan CMF

Revision	Date	Description / Changes
A	2022 03 20	initial CMF

1

seat pan CMF

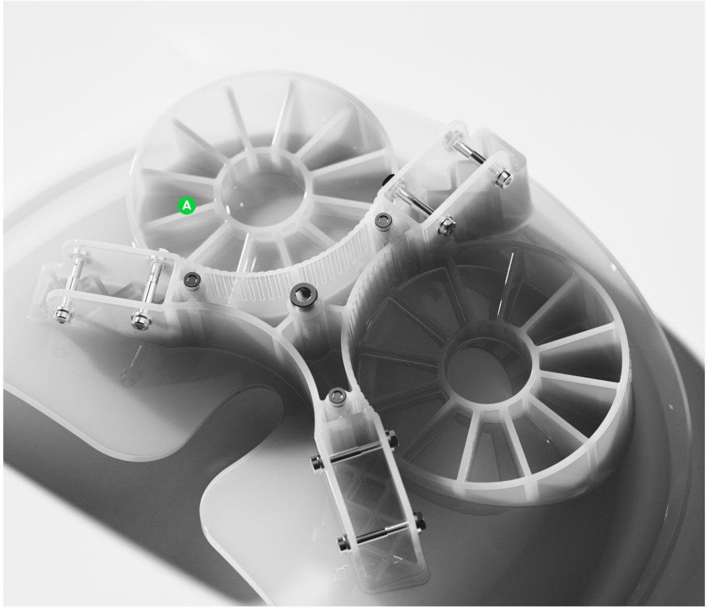
product summary images

2

seat pan CMF

materials details

A
part: seat pan body
material: urethane
color: clear or cloudy
finish: gloss (as possible)
process: silicone mold vacuum cast



3

seat pan CMF

hardware details

1
part: radial hex bolt (x6)
spec: M6 35mm, partial thread
finish: silver gloss
reference: McMaster-Carr #92235A432

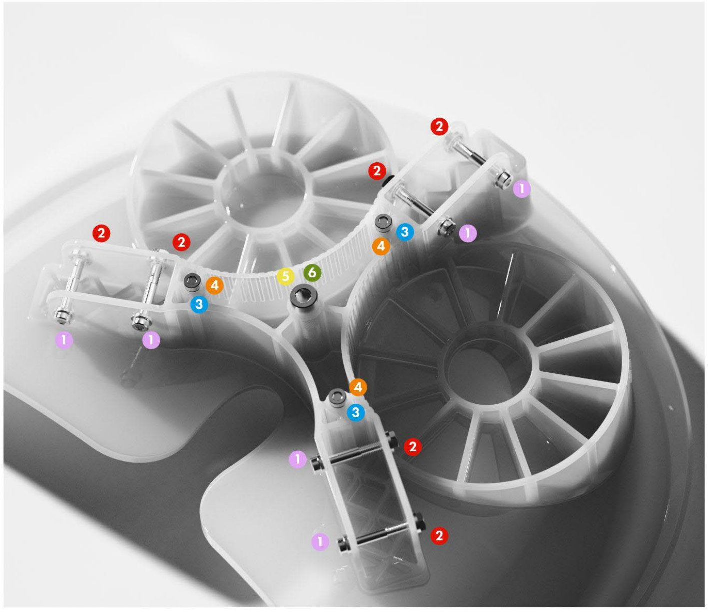
2
part: flanged hex nut (x6)
spec: M6
finish: silver gloss
reference: McMaster-Carr #94920A400

3
part: M6 threaded insert (x3)
spec: for M6 hex bolt (part #4)
finish: silver gloss
reference: McMaster-Carr # 90741A290

4
part: M6 hex bolt (x3)
spec: M6 30mm, full thread
finish: silver gloss
reference: McMaster-Carr #91290A332

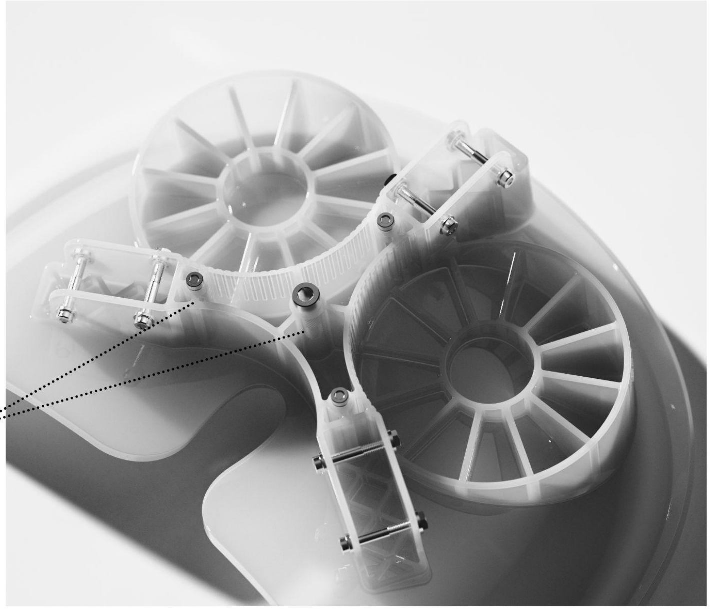
5
part: M10 threaded insert (x1)
spec: for M10 hex bolt (part #6)
finish: silver gloss
reference: McMaster-Carr #90741A826

6
part: M10 hex bolt (x1)
spec: M10 30mm, full thread
finish: silver gloss
reference: McMaster-Carr #96144A263

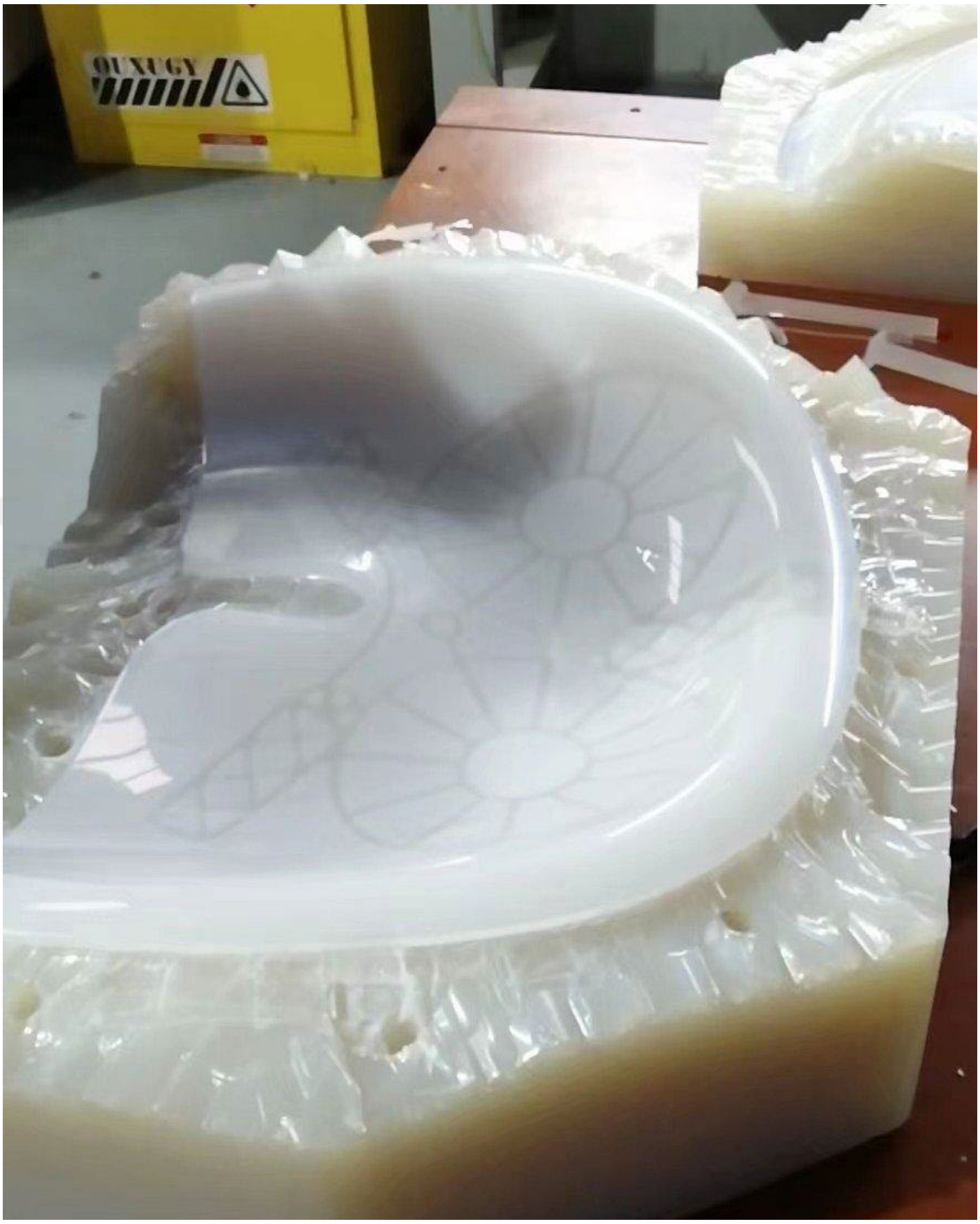


4

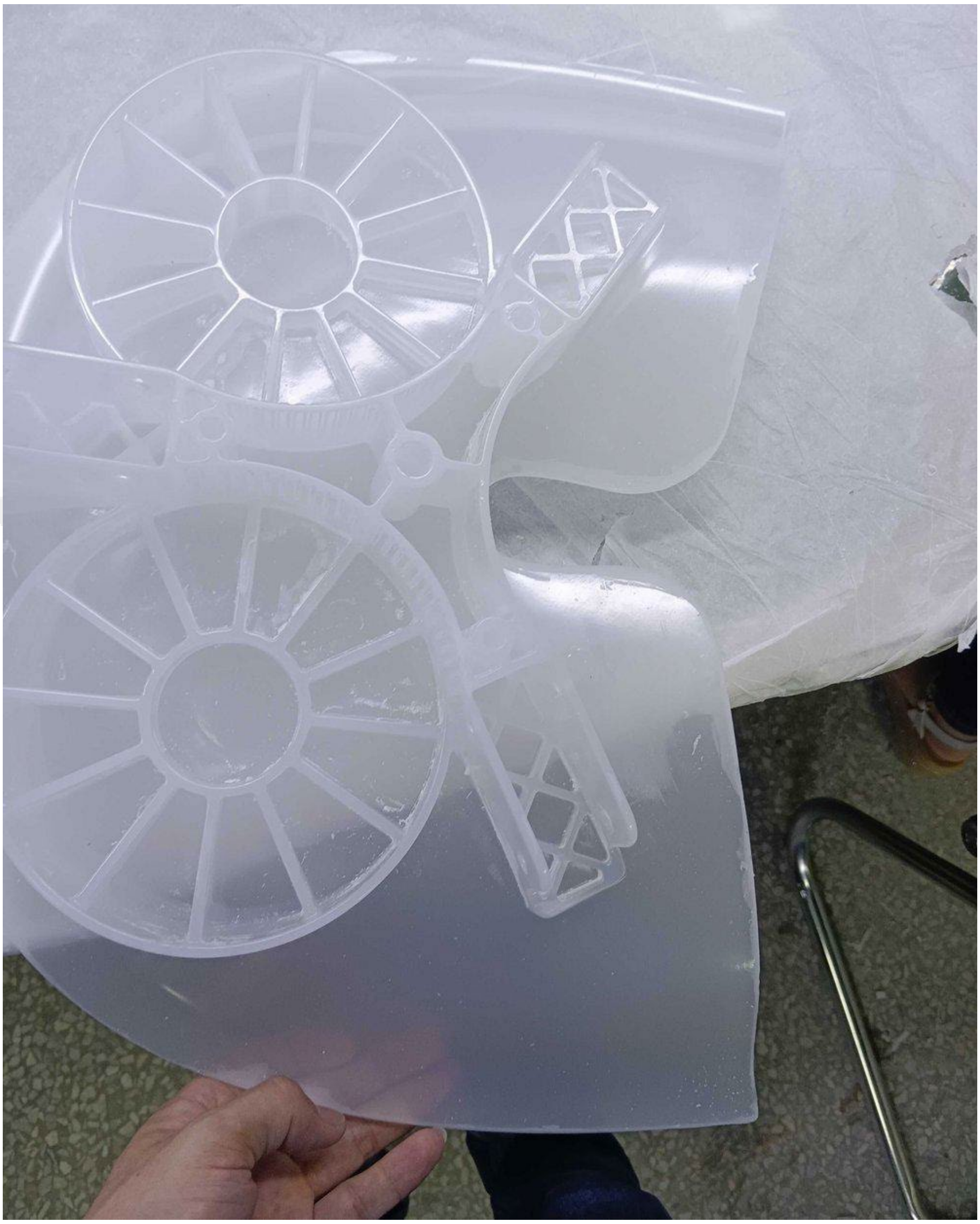
please modify CAD to fit preferred threaded insert type, or send required hole dimensions to Max Plummer for modification.



E. Seat Pan Manufacturing Photos


OUXUGY


ATHLETI



F. Selected Demonstration Stools

Demonstration Stool 1

Demonstration Stool 2

Demonstration Stool 3

Demonstration Stool 4

Demonstration Stool 5

Demonstration Stool 6

Demonstration Stool 7

Demonstration Stool 8

G. Artisan Project Information Pamphlet

Hibrid Tabure Araştırma Projesi
Sanatçı/Zanaatkarlar İçin Bilgiler
Yaz 2022

Max Plummer
maxplummer@gmail.com
+1 615 480 8647 (whatsapp)

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Araştırmanın Konusu

Bu araştırma projesinin konusu seri üretim parçalarının, sanatçı ya da zanaatkarların ürettiği parçalarla birleşerek ortaya çıkan hibrid ürünlerin (iki üretim metodundan parçaları barındıran ürünler) yararları üzerinedir.

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Araştırmanın amacı seri üretim metodları ve sanatçı/zanaatkar üretim teknikleri bir üründe buluştuğunda neler olduğunu olduğunu incelemektir. Bu inceleme sırasında her iki yöntemin yararlı taraflarının belirginleşmesi ve kısıtlayıcı unsurlarının azalması beklenmektedir. Genel anlamda bu araştırma yerel sanatçı ve zanaatkarların ürünlerinde işlevselliği odağa alarak pazarda rekabet güçlerini arttırmalarına yardımcı yöntemleri ortaya koymayı amaçlar.

Sanatçı ve Zanaatkarların Projedeki Rolü

Sanatçı ya da zanaatkarların oturakları diledikleri şekilde tamamlayarak güzelliği, uzmanlıklarını ve çalışma alanlarına duydukları tutkuyu sergeleyen tabureler orataya çıkarmaları beklenmektedir. Sizler kendi kültürünüzden, yaratıcılığınızdan ya da yerel komünitenizden ilham alan form, desen ve malzemeler kullanabileceğiniz gibi sizi harekete geçiren herhangi bir fikri bu taburelere yansıttığınızda neler olabileceğini görmeyi heyecanla bekliyoruz. Son ürünün oturmak için rahat ve sağlam olması önem taşımakla birlikte oluşturacağınız formları sizin yaratıcılığınıza bırakıyoruz. Oturak setindeki parçalara istediğiniz gibi ekleme, çıkarma ya da değişim işlemleri uygulamaktan çekinmeyiniz.

Tabure oturağı (ürünle birlikte verilir), montaj için istediğiniz yöntemleri kullanmanızı kolaylaştıracak birçok bağlantı elemanıyla birlikte teslim edilir. Oturağın amacı, sadece rahat bir oturma yüzeyi sağlamaktır; nesnenin geri kalanını istediğiniz gibi tanımlamaya ve tamamlamaya davetlisiniz. Mümkün olduğunca özgür çalışabilmeniz için nesneyle ilgili yönlendirmeler özellikle verilmemiştir.

Taburelerin Tamamlanma Süresi

Tabureler en geç 30 Ağustos 2022 günü araştırma ekibi tarafından teslim alınacaktır.

Bütçe

Malzeme maliyeti 1.000₺'ye kadar araştırma ekibi tarafından karşılanacak olup, analiz sonrası tabureniz size hediye edilecektir.Tüm bağlantı donanımı oturak setine dahildir, ancak herhangi birinin/hepsinin kullanılması isteğe bağlıdır.

Proje Sonrası Adımlar

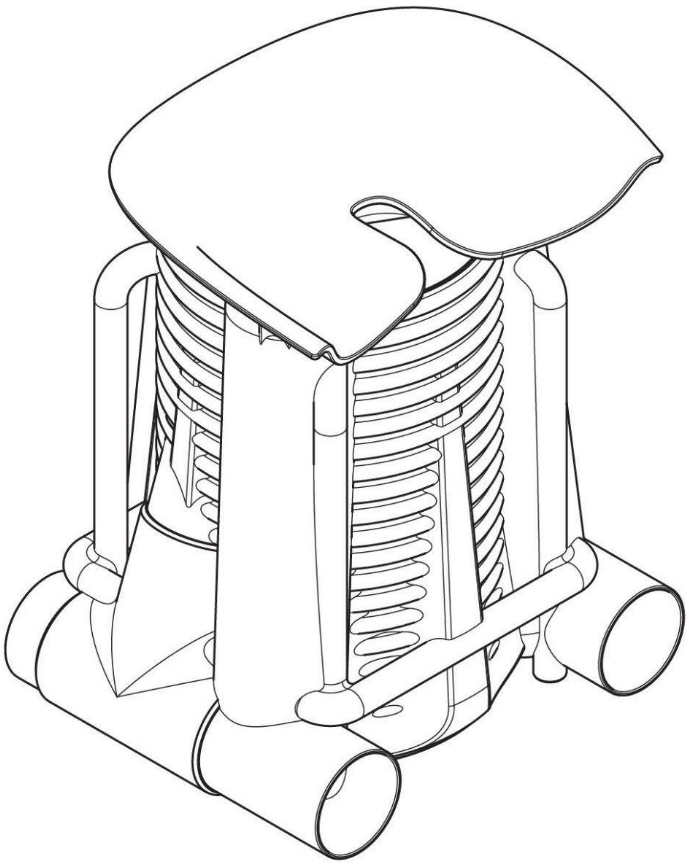
Tabureler araştırma ekibi tarafından incelendikten sonra ODTÜ'de bir sunum kapsamında sergilenecek, ve size teşekkür hediyesi olarak teslim edilecektir.

Teşekkürler!
-Max Plummer

H. Artisan Seat Pan Information Pamphlet

Hibrid Tabure Araştırma Projesi
Tabure Oturağı Kullanım Kılavuzu
Yaz 2022

Max Plummer
maxplummer@gmail.com
+1 615 480 8647 (whatsapp)



içindekiler

//

genel boyutları

genişlik:	470mm
derinlik:	350mm
yükseklik:	110mm

ağırlık:	1.4kg
malzeme:	poliüretan
renk:	açık

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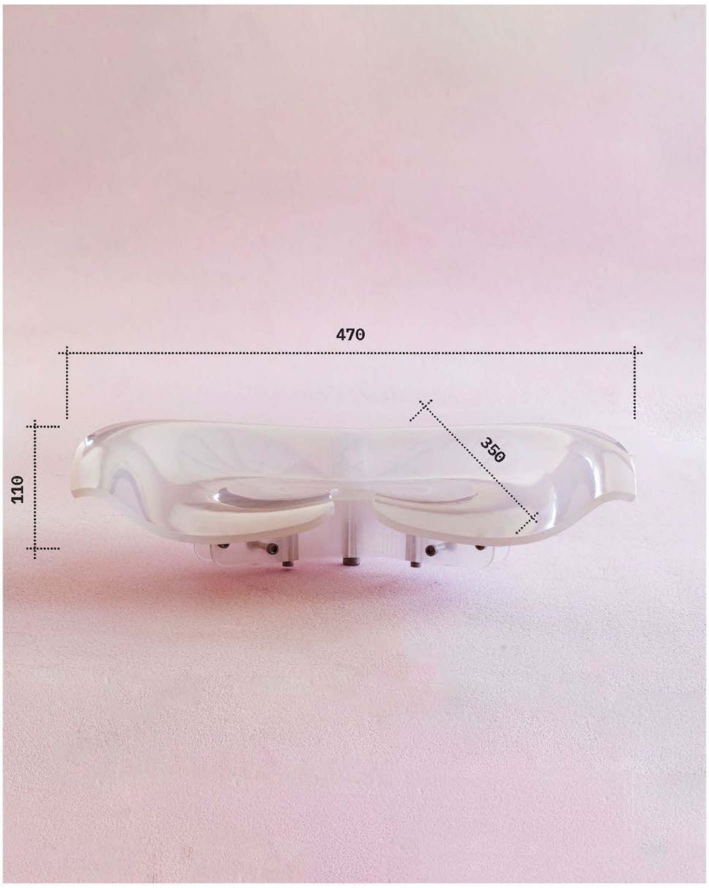


bağlantı yerleri

1. 3x oluk: 50mm genişlik x 84mm uzunluk x 35mm derinlik

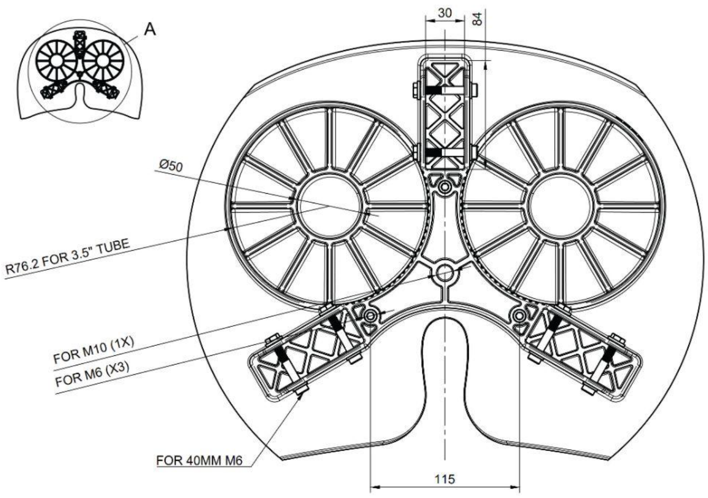
2. 3x M6 vida: 115mm merkez çevresinde üç nokta

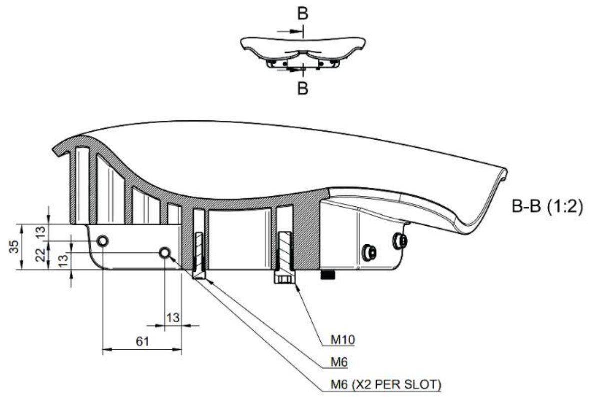
3. 1x M10 vida: merkezde

4. 2x daire: 152.4mm / 3.5″ çap

//

teknik çizimler





I. Stool 1 Interview

I believe the stool I made is sturdy & durable.	
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	4
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	4
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

–

Why did you decide to finish the object in the way that you did?

In my opinion the design was convenient to many types of applications and forms. So we tried to highlight [company name] firm ideology that is using different wood types together and designing without waste. The middle two pieces are pulled inside while outer two pieces stay the same. The stool design was a solution for many different leg designs that we were going to make.

What were some of the considerations you thought about when deciding on the design of the object?

Our aim was to follow the general design language and norms of [company name].

How much time did you spend deciding on the design before you started working with the object?

The design and sketch process was about 1 week. We traced the lines of the stool top design from a photo that we took. After, we made different sketches using the guidelines of the stool.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

We designed the stool and decided to use with which connection part we will connect with. After the production, the connection parts didn't fit perfectly with the legs so we needed to add a piece to offset the connections. We didn't had a prototype but we made revisions on the final product.

How much time did it take you to make the object?

1 week design and 1 week production process. Total 2 weeks

What went into your decision about how to connect the top and the bottom parts?

The connection parts guided us on the stool.

What was it like to adapt your workflow to incorporate the scale-produced part?

It was much easier. Usually when we're making a stool, chair (or a product that is directly connected with human comfort) we make several examples and try on our own if its suitable and comfortable or not. But having a piece that is trusted and designed only for this purpose made our work much easier. The only thing that we discussed on was the general design and the connections.

What benefits and challenges came from using the scale-produced part?

The advantage was the part made our work much easier , disadvantage was the connection parts limiting us. And also the color and material of the part, gives wood a more ordinary look when combination.

How do you think the final object would be different if you hadn't used the scale-produced part?

It would be more uncomfortable, we should have consider the ergonomics of the seat. Also using screws are not something we prefer on our designs. Usually the wood is glued and clamped for letting it dry. This process takes an amount of time. The seat had its own screws that weren't bothering the overall look. Using them bought us time.

If you were to do this project again, what would you change about your process and/or final object?

We would thought the connection details more.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

Maybe could pull the connections a little more to the sides

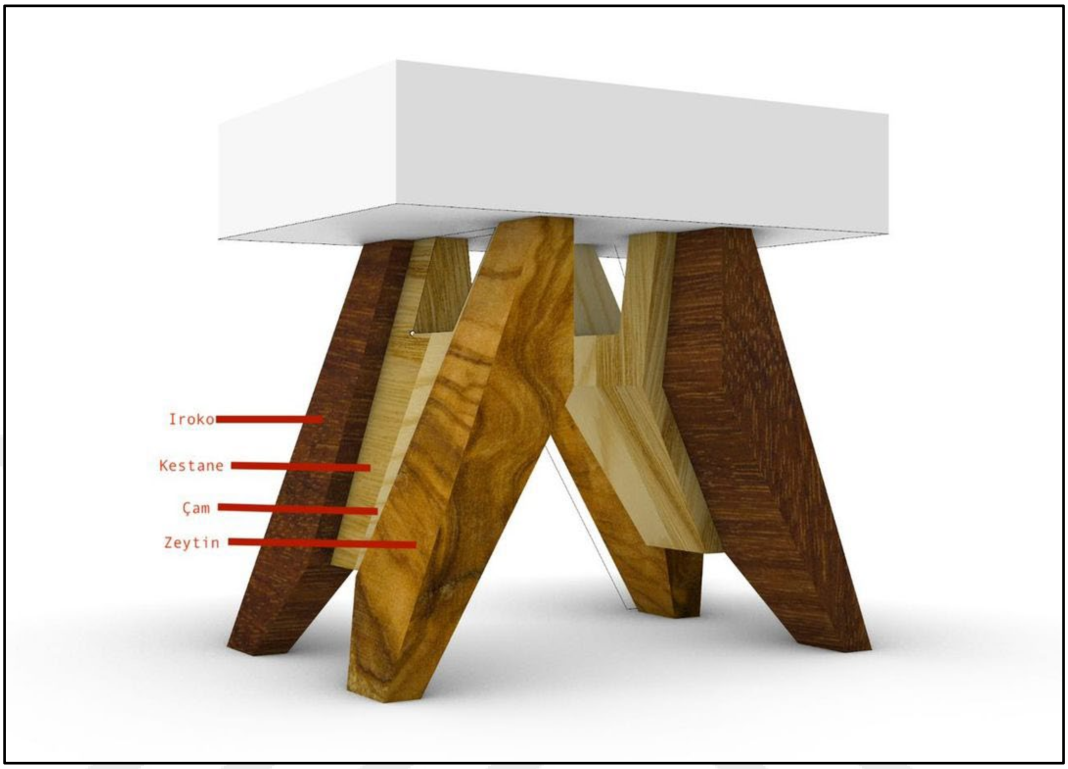
Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

It makes the process much shorter but as [company name] we do not prefer to use scale-produced parts.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

Maybe a manual for application would help. Or the ways that we can use the connection parts on a video or booklet.

J. Stool 1 Production Documents



K. Stool 2 Interview

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	3
It was easy to create the kind of object that I wanted to.	2
The seat pan restricted what I was able to make well.	4
I believe this making method has a place in our business.	4
I'd be interested in using this making method in the future.	4

–

Why did you decide to finish the object in the way that you did?

Considering that the seat given to us was designed with a focus on comfort, we wanted it to fulfill its task of comfort and to be lost in the complementary piece we will make.

What were some of the considerations you thought about when deciding on the design of the object?

We aimed for both materials to behave in harmony and as a whole.

How much time did you spend deciding on the design before you started working with the object?

Among the 20-30 different proposals studied under the leadership of HurdaHane founders, Architects Seda Dedeoğlu Sezer and Ertuğ Sezer, we decided on this design that best fits our criteria.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

We have tried many times in the digital environment, but after deciding on the project, there was no need to try it during the production phase.

How much time did it take you to make the object?

It took 3 weeks with the design phase and production

What went into your decision about how to connect the top and the bottom parts?

As we handled the project as a whole, the merge part did not require a separate decision.

What was it like to adapt your workflow to incorporate the scale-produced part?

As we handled the project as a whole, the merge part did not require a separate decision.

What benefits and challenges came from using the scale-produced part?

A ready-made piece set us a beautiful boundary and purpose for finding the right design.

How do you think the final object would be different if you hadn't used the scale-produced part?

The main focus that determined our purpose and boundaries was the seat. If there was no seat, it would have been a completely different product created for a different purpose.

If you were to do this project again, what would you change about your process and/or final object?

No, we are very happy with the result.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

The curves brought some difficulties in production. But if it had been a flat seat this time, the end product would not have been as impressive.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

The curves brought some difficulties in production. But if it had been a flat seat this time, the end product would not have been as impressive.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

Of course, we see it as advantageous if it makes design and production more effective. Knowing the material used, knowing its limits and flexibility always ensures that more solid steps are taken in design.

L. Letter from the Makers of Stool 2 (included with submission)

Sevgili Max,

Oturak elimize ilk ulaştığında onu detaylı inceledik. Tasarım ekiplerimizle bir araya gelerek 30'a yakın fikir ürettik ve oturağı bir çok farklı şekilde değerlendirdik. Konforu ve rahatlığı ile öne çıkan seri üretim bu oturma elemanını yeni bir formun içine yerleştirmek yerine kendi formunun izdüşümünü kullanarak, birbiri içinde bütünleşmiş ama yine de hibritliğini koruyan bir ürün ortaya çıkardık. Seri üretim metodları ile oldukça pratik bir şekilde üretilebilen bu parçanın yumuşak ve kavisli dış hatlarını kullanarak ahşap malzemenin çekiciliğini, usta ellerin sanatını ve zanaatla ortaya çıkan ürünün eşsizliğini vurgulayan detaylara sahip bir ürün çıkardık.

Umarım araştırmanın içinde güzel bir yer alır. Bizi bu araştırmanın bir parçası haline getirdiğin için teşekkür ederiz.

Sevgiler,
HurdaHane Ekibi

Dear Max,
When we first received the seatpan, we examined it in detail. We came together with our design teams and produced about 30 ideas and evaluated the seatpan in many different ways. Instead of placing this industrially produced seating element, which stands out with its comfort and convenience, in a new form, we created a product that is integrated within each other but still preserves its hybridity, by using the projection of its own form. By using the soft and curved contours of this piece, which can be produced in a very practical way with mass production methods, we have created a product with details that emphasize the attractiveness of the wood material, the art of master hands and the uniqueness of the product that comes out with craftsmanship.

I hope it takes a good place in the research. Thank you for making us a part of this research.

With Love,
HurdaHane Team

M. Stool 3 Interview

I believe the stool I made is sturdy & durable.	2
I believe the stool I made is comfortable.	2
I believe the stool I made is unique.	4
I am proud of what I created.	4
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	2
This project was satisfying to complete.	4
Working with the scale-produced part (seat pan) was simple.	4
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	2
I believe this making method has a place in our business.	4
I'd be interested in using this making method in the future.	4

–

Why did you decide to finish the object in the way that you did?

While integrating a modern plastic material with a natural material, ceramic, we wanted to draw attention to the evolutionary process between these materials.

What were some of the considerations you thought about when deciding on the design of the object?

Harmony and contrast

How much time did you spend deciding on the design before you started working with the object?

about a day

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

No

How much time did it take you to make the object?

If we subtract the drying and waiting times of the clay, it is about 4 hours.

What went into your decision about how to connect the top and the bottom parts?

This was not a moment of decision. It developed organically within the emotion desired to be felt.

What was it like to adapt your workflow to incorporate the scale-produced part?

Working with a ready-made piece is like a one-lane road to a certain emotional space. Many things you see on that road can be included in the design, which allows you to see more on a narrow road while restricting other options.

What benefits and challenges came from using the scale-produced part?

Working with a ready-made piece is like a one-lane road to a certain emotional space. Many things you see on that road can be included in the design, which allows you to see more on a narrow road while restricting other options.

How do you think the final object would be different if you hadn't used the scale-produced part?

A more organic form would be possible.

If you were to do this project again, what would you change about your process and/or final object?

Seat piece could have been modular

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

Could be modular

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

Yes there are benefits

What kind of information would you need to feel confident about creating objects with scale-produced parts?

I think that certain emotional states will be needed more than knowledge. Excitement and stability.

N. Stool 4 Interview

I believe the stool I made is sturdy & durable.	4
I believe the stool I made is comfortable.	4
I believe the stool I made is unique.	3
I am proud of what I created.	3
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	5
I believe this making method has a place in our business.	2
I'd be interested in using this making method in the future.	2

–

Why did you decide to finish the object in the way that you did?

Since I used glass as the material for the stool legs, I only had as many shaping processes as the glass would allow, so I decided to work on a sharp and cubic form since the form I created should be able to be made with glass.

What were some of the considerations you thought about when deciding on the design of the object?

Since I used glass in the object design, I prioritized the light transmittance of the glass while creating the design.

How much time did you spend deciding on the design before you started working with the object?

The time I spent on the design before I started the production process was about a week.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

I made a few trials before, and as a result of these trials, the design took its final form.

How much time did it take you to make the object?

Along with the design process, it took nearly 3 weeks to complete the object. This is because glass is a very fragile and hard-to-work material, so I had to rewind it due to the problems I encountered.

What went into your decision about how to connect the top and the bottom parts?

Considering the possibility that the legs designed in the seating piece could be damaged in use, I thought that they should not be whole, so I decided to design the legs as modular.

What was it like to adapt your workflow to incorporate the scale-produced part?

The ready-made product allowed me to carry out an easy design process apart from some constraints in the design process.

What benefits and challenges came from using the scale-produced part?

Designing on a ready-made part made some analyzes easy, but there were some restrictive situations as there were parts determined for the feet in the ready-made part.

How do you think the final object would be different if you hadn't used the scale-produced part?

If a ready-made product had not been given, the feet would have been longer and thicker in the product I delivered, which would have made it more functional in use. I could have achieved a more aesthetic and holistic image by moving the material I used to different parts of the product.

If you were to do this project again, what would you change about your process and/or final object?

If I were to do it from the beginning, I could have obtained an unusual image by shaping the material I used with different production techniques. Since the material I use is fragile, I made a design by minimizing the risk and making it usable, I could develop this situation further and make a design that can be used comfortably in daily use.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

It would have been easier for me to work if the places designated for the feet were mobile.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

Yes, I see because as a designer, I don't/we don't have a command of every material, it is possible to be more productive by combining such mass-produced parts with the materials that we dominate.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

More information about the shaping and production of the material of the seat would be most helpful.

O. Stool 5 Interview

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

–

Why did you decide to finish the object in the way that you did?

Based on past experience that might fit the design of the upper part, I decided that this might be the way it is.

What were some of the considerations you thought about when deciding on the design of the object?

Aesthetics, balance, and durability were on mind.

How much time did you spend deciding on the design before you started working with the object?

1 or 1.5 hours, but with 55 years experience before.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

No.

How much time did it take you to make the object?

About one day.

What went into your decision about how to connect the top and the bottom parts?

By taking the balance into consideration and confirming their position.

What was it like to adapt your workflow to incorporate the scale-produced part?

Positive, simple, and easy.

What benefits and challenges came from using the scale-produced part?

There were no disadvantages. The biggest advantage is that the process was fast.

How do you think the final object would be different if you hadn't used the scale-produced part?

It would have taken a longer time to complete the object.

If you were to do this project again, what would you change about your process and/or final object?

I wouldn't change anything.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

It was so easy this way. It worked easily.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

I think that we can make a difference in amount sales.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

It is more reliable if the infrastructure is established. It makes it easy to create the object.

P. Stool 6 Interview

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	4
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

–

Why did you decide to finish the object in the way that you did?

Having three (3) connection points and a thread in the middle that I can connect all of them with one piece reminded me of the work I came up with. I did my first thought without thinking of anything else.

What were some of the considerations you thought about when deciding on the design of the object?

Being simple, all feet can be connected in terms of durability.

How much time did you spend deciding on the design before you started working with the object?

I worked on paper one day, then I made some drawings on the computer for CNC cutting. I completed the design in two days.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

There was no trial, I went directly to the production of the original product.

How much time did it take you to make the object?

all in one day

What went into your decision about how to connect the top and the bottom parts?

I thought the three separate ports would stretch the feet too much and damage the joints.

What was it like to adapt your workflow to incorporate the scale-produced part?

I acted to finish the product directly, it was very easy to go over a ready-made piece without thinking about anything extra.

What benefits and challenges came from using the scale-produced part?

Acting on a ready-made piece was very easy as it gave a direct idea to create other stages. Although the disadvantage is not much, acting on a single part can be restrictive

How do you think the final object would be different if you hadn't used the scale-produced part?

I would make the seat part from a wooden plate that I kept smaller, the feet would still be angled and tapered.

If you were to do this project again, what would you change about your process and/or final object?

I would use a more robust design or material for the joints

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

Everything needed was available

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

Of course it is very useful. Because if even some of the work you will do is ready for direct assembly, it will be very useful in terms of time and workmanship.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

Manufacturing knowledge, having technical knowledge about the relevant subject, having experienced the necessary techniques

Q. Stool 7 Interview

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	4
I believe the part I made matches the part I was given.	4
I believe the stool I made could easily be sold.	4
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	3
It was easy to create the kind of object that I wanted to.	3
The seat pan restricted what I was able to make well.	3
I believe this making method has a place in our business.	2
I'd be interested in using this making method in the future.	4

–

Why did you decide to finish the object in the way that you did?

Comfort was at the forefront

What were some of the considerations you thought about when deciding on the design of the object?

It was at the forefront to use the screwing devices of the seat piece we have

How much time did you spend deciding on the design before you started working with the object?

Two weeks

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

We made other attempts

How much time did it take you to make the object?

1 hour after all parts are prepared

What went into your decision about how to connect the top and the bottom parts?

[no response]

What was it like to adapt your workflow to incorporate the scale-produced part?

It slowed us down and limited our imagination a little

What benefits and challenges came from using the scale-produced part?

There are usually disadvantages, because you can't go beyond what you've been given.

How do you think the final object would be different if you hadn't used the scale-produced part?

I would use more wood, and consider coloring

If you were to do this project again, what would you change about your process and/or final object?

I added a lot of details, I would also prioritize ergonomics a little more.

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

I would put the mounts in different places.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

If you have a project that is compatible with the ready part, this increases production.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

You need to know the ready piece well.

R. Stool 8 Interview

I believe the stool I made is sturdy & durable.	4
I believe the stool I made is comfortable.	3
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	3
I believe the stool I made could easily be sold.	3
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	5
It was easy to create the kind of object that I wanted to.	5
The seat pan restricted what I was able to make well.	2
I believe this making method has a place in our business.	4
I'd be interested in using this making method in the future.	5

–

Why did you decide to finish the object in the way that you did?

It must be a lathe sub-base and the center hub must be rotated. If it was stable, there would be sitting discomfort. I wanted it to be a swivel chair for sitting comfort, not fixed

What were some of the considerations you thought about when deciding on the design of the object?

first of all solidity, then sitting comfort.

How much time did you spend deciding on the design before you started working with the object?

I thought for a long time to make a decision and also had conversations with [the researcher]. At first I thought of a non-freezing foot, then I decided to make it rotate.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

I made a few prototypes.

How much time did it take you to make the object?

production time lasted 16 hours. designed and produced in a month

What went into your decision about how to connect the top and the bottom parts?

Mine consists of 7 pieces. The ones coming out of the lathe were added by welding, we welded from the lower ball to rotate it. We adjusted the apparatus according to the screw place in the plastic/

What was it like to adapt your workflow to incorporate the scale-produced part?

It was not difficult for me, but the system is not easy in general. to assemble too many pieces, to think of measures so that the feet do not scratch the floor.

What benefits and challenges came from using the scale-produced part?

advantage over time. to connect. to make connections, to keep it in balance.

How do you think the final object would be different if you hadn't used the scale-produced part?

I could have made a motif wrought iron with a piece I produced myself

If you were to do this project again, what would you change about your process and/or final object?

I would try at least three different things

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

The piece was very nice, I was able to assemble it without any trouble.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

If I want to give a lot of this product, of course, mass production will be easier.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

I have 50 years of experience. inexperienced not clear answers

S. Stool 9 Interview

I believe the stool I made is sturdy & durable.	5
I believe the stool I made is comfortable.	5
I believe the stool I made is unique.	5
I am proud of what I created.	5
I believe the part I made matches the part I was given.	5
I believe the stool I made could easily be sold.	5
This project was satisfying to complete.	5
Working with the scale-produced part (seat pan) was simple.	3
It was easy to create the kind of object that I wanted to.	4
The seat pan restricted what I was able to make well.	1
I believe this making method has a place in our business.	5
I'd be interested in using this making method in the future.	5

–

Why did you decide to finish the object in the way that you did?

I decided to adapt to human physiology and an ergonomic design thought.

What were some of the considerations you thought about when deciding on the design of the object?

I decided based on the strength and dimensions of the material and the area of use.

How much time did you spend deciding on the design before you started working with the object?

I spent 2-3 hours to design the product.

Did you make any prototypes or use any other tools to learn about what the object would be before you made it?

I didn't make a prototype. The reason why I did not do it is because of the experience and experience we have as a company.

How much time did it take you to make the object?

Two working days

What went into your decision about how to connect the top and the bottom parts?

I decided to choose the easiest mounting method.

What was it like to adapt your workflow to incorporate the scale-produced part?

It stretched the design process a bit, but it wasn't too difficult.

What benefits and challenges came from using the scale-produced part?

Improving the assembly process and method can be considered as a disadvantage.

How do you think the final object would be different if you hadn't used the scale-produced part?

The type of material to be used, its color, weight and the movement mechanism of the product (such as right and left turn, up and down movement)

If you were to do this project again, what would you change about your process and/or final object?

The type of material to be used, its color, weight and the movement mechanism of the product (such as right and left turn, up and down movement)

In what ways could the scale-produced part (seat pan) be improved to match your style or ways of working?

Actually, there is no need to make changes, it can be worked in this way.

Do you see any advantages to incorporating scale-produced parts in your business? If so, how would you imagine they become part of it?

Since the materials to be used for the products and the work done in mass production will be carried out as standard, the quality will increase with both the material supply and the speed of work. Mass production of the product in question can be done easily.

What kind of information would you need to feel confident about creating objects with scale-produced parts?

We are a company that has the capacity to make mass production with the knowledge, experience and experience we have.

T. Ethical Approval Letter

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

DUMLUPINAR BULVARI 06800
ÇANKAYA ANKARA/TURKEY
T: +90 312 210 22 91
F: +90 312 210 79 59
ueam@metu.edu.tr
www.ueam.metu.edu.tr

13 EYLÜL 2022

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Owain Pedgley

Danışmanlığını yürüttüğünüz Max Plumm'in **"Leveraging Multiple Scales of Production in Hybrid Objects"** başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **0484-ODTUİAEK-2022** protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Mine MISIRLISOY
Başkan

Doç. Dr. İ.Semih AKÇOMAK
Üye

Dr. Öğretim Üyesi Müge GÜNDÜZ
Üye

Dr. Öğretim Üyesi Şerife SEVİNÇ
Üye

Dr. Öğretim Üyesi Murat Perit ÇAKIR
Üye

Dr. Öğretim Üyesi Süreyya ÖZCAN KABASAKAL
Üye

Dr. Öğretim Üyesi A. Emre TURGUT
Üye