International Journal of Current Innovations in Interdisciplinary Scientific Studies

Volume 7, Issue 1, (2023) 15-25

www.ij-ciss.eu

The development of a conceptual framework for textile design products

Reham Abdelbaset Sanad [1], Damietta University, Faculty of Applied Arts, Textile Printing, Dyeing and Finishing Department, Egypt

Suggested Citation:

Sanad, R. A. (2023). The development of a conceptual framework for textile design products. *International Journal of Current Innovations in Interdisciplinary Scientific Studies 7(1),* 15-25. https://doi.org/10.18844/ijciss.v7i1.8822

Received from February 09, 2023; revised from May 26, 2023; accepted from June 23, 2023;
Selection and peer review under the responsibility of Assist. Prof. Dr. Ezgi Pelin YILDIZ, Kars Kafkas University, Turkey.

Abstract

A conceptual framework is considered one of the versatile design management tools that could be used to analyze design variations and contexts. This study is focused on the development of a conceptual model for managing and producing 3 d. This is because the textile design process plays a pivotal role in the textiles, clothing, and fashion industries. Therefore, understanding the structure, opportunities, possibilities, and process sequence involved in the textile design process was found essential. This paper is concerned with illustrating the textile designers' adaptability to new technologies available to them and studying models of the production processes that construct the textile design production process from start to end. The comparison between the studied frameworks, models, and design flows shows that variable terms of similar meanings and range are used. An evaluation process against criteria should be conducted. It was concluded that the technological tools available should be highlighted clearly in future developed frameworks.

Keywords: Consumer; conceptual framework; needs; textile design; theoretical model.

* ADDRESS FOR CORRESPONDENCE: Reham Abdelbaset Sanad, Damietta University, Faculty of Applied Arts, Textile Printing, Dyeing and Finishing Department, Egypt
E-mail address: reham_sanad@hotmail.com

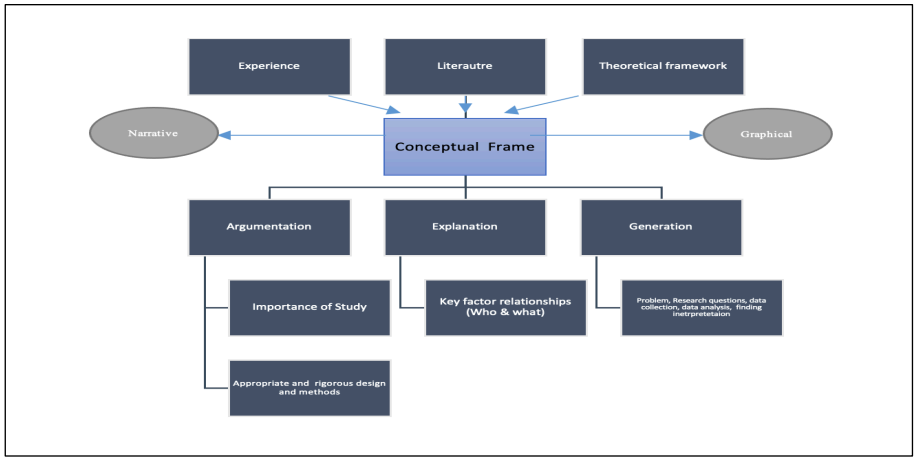
1.Introduction

A Framework is a supplementary configuration or system of rules or ideas used to construct something. Research investigations including design would employ both theoretical and/or conceptual frameworks. A Theoretical framework represents the general relationships in the studied context or topic; however, the conceptual framework illustrates more definite, clear, and specific variables' interrelationships in a study or design project. Therefore, it depicts the research study direction and nature of the studied subject in a more detailed scope namely the input, process, and output (Afribary, 2021).

The development of a conceptual framework should be based on understanding its purpose which would be argumentation, explanation, and/or generation. Argumentation is concerned with the research subject significance, suitability, and precision of methods used i.e., justifying the study. The Explanation is meant to study the relationships between subject/topic elements, and the Generation addresses the research problem, questions, and methods to get research components aligned. All these purposes would be augmented in one model to make it comprehensive. The presentation of a conceptual framework would be in graphical and/or narrative forms. Sources of conceptual framework construction include experience, existing theories, research, and explorations. Therefore, it would be concluded that a conceptual model is a created -not found- structure by a researcher (designer) that involves the studied features and components derived from the study sources (Maxwell, 2005; Burkholder et al., 2019). See Figure 1 illustrating the Conceptual model's purposes, representation forms, and sources.

Figure 1

Purposes, Sources, and Presentations of Conceptual Framework



The Conceptual framework or the Integrative diagram are variations of tools created to develop and clarify theory. However, Concept mapping is a tool for developing and presenting the conceptual framework of a study or design project. It consists of concepts -represented by simple labeled shapes -and their relationships (shown using arrows and lines). Concept maps wouldn't illustrate all aspects of a subject, studied topic, fact, or experience, but they illustrate a simple part of a complicated fact (Maxwell, 2005).

The development of a concept map is based on a set of concepts resourced from previously mentioned sources namely existing theory, experience, or thoughts. These concepts would be presented using keywords, thoughts, ideas, or terms of the studied topic or subject produced by brainstorming. Later,

this model is tested for its purpose, interrelations, meanings, and implications. Visual diagrams would be illustrated in text narratively which enhances and develops the built model or framework (Maxwell, 2005).

The making process of "Design (creative) products" has been considered by researchers and designers as significant research work. Therefore, the first part of this paper's introduction presented general definitions and approaches to making frameworks. This second part of the introduction gives more details regarding the development process of the conceptual framework. For Design Framework, it is a scheme or structure consisting of a design project elements, processes, steps, and tools employed in the creation of a product supporting its existence and production and assisting its design language. It has several advantages and purposes for enhancing the efficiency of the creation processes in terms of time, ease, and consistency of standard (look, feel, credibility, and experience of the consumer), and customizing the production line, also known as mass Customization (Jo Anderson-Connell et al., 2002; Guan et al., 2012; Ruiz-Alba et al., 2023).

Design framework can enhance collaboration by well-organizing and clarifying the flow of the design process and communication employing clear standards resulting in time efficiency. The usage of a design framework would ease the employed processes' update and/or change into more flexible and accurate forms. Moreover, the design management framework identifies and defines the necessary sequential processes and steps that a product should pass through in the production line from the launching process of a project to obtaining the feedback of the consumers. It would be employed to develop an existing product or to create a new one in terms of its functional, aesthetical, or expressive qualities (Singh et al., 2019). This means that the framework is valuable for both companies and consumers to achieve their goals i.e., maximizing revenue for the first and obtaining the required product for the latter (Shahi et al., 2021). In other words, for design products including textile and apparel products "Product Development Frameworks" are employed to enable designers and manufacturers to make an efficient successful artifact fulfilling consumer needs. It is one of the important design management tools through which design products are developed considering new product features required in the market or upgrading existing ones (Larsson, 2020). Constructing a design framework would start with establishing the foundation of the targeted design such as color then work on the less critical design elements such as design motif and repeat. In a later stage, variations of previously stated design elements would be determined for instance color tints, tones, and shades supporting design language.

It is noteworthy that there have been key transfers and innovations that took place in the textile industry in the last centuries to fulfill consumers' needs and maximize companies' revenues. However, there have been found limited studies highlighting the creation and development process of textile design frameworks. Based on the importance and significance of the design management framework, it was found important to focus -in this study- on the development of a conceptual model for managing and producing textile designs (especially printed ones). This is because the textile design process plays a pivotal role in the textiles, clothing, and fashion industries. Therefore, understanding the structure, opportunities, possibilities, and process sequence employed in the textile design process was found essential. This paper is concerned with illustrating the textile designers' adaptability to approved, accredited, and suggested design models in previous research studies.

1.1. Purpose of study

This study aims to investigate the possible frameworks that could be employed or adopted in the field of the textile industry meant to control and manage the design process. Moreover, it aims to conduct an analytical comparative study between these frameworks to find out the differences and similarities. Consequently, a general conceptual framework would be developed based on the output of the analysis conducted. This paper is concerned with answering the following questions: would a common/ independent design framework be developed and adopted by most or all textile design projects?

How to apply, use, modify, and implement general design models in the textile area? The Lamb & Kallal (1992) FEA consumer needs model and apparel design framework will be investigated for adoption in the textile design process.

This paper's value lies in its contribution to extending the literature on design management and deepening the understanding of textile designers and students regarding Product development frameworks that identify processes employed in creating textile design products. It is focused on advancing the comprehension of creating textile design products to be a base and supportive knowledge for textile design researchers, designers, and students. The main objective of this research is to support textile design students, academics, researchers, and professional designers by providing an integrated conceptual design frame outlining the design processes enhancing the efficiency of all processes. Consequently, a generic conceptual framework conceptualizing and describing the production process of this product is proposed /recommended. This will be a result of reviewing and referencing previous research papers concerned with textile and apparel design methodology.

2. Materials and Methods

This paper employed content analysis methodology to analyze the usability and applicability of significant conceptual frameworks and models considered, developed, and proposed in previous research studies in the field of Print textile design. Two types of models discussed in research studies related to general and graphics design are investigated. Finally, a comparative study will be conducted between all the investigated models. Therefore, to answer the research questions; the following steps/phases were conducted:

2.1. Procedure

First Phase: The focus of this stage is the contextualization of the argument; research studies explored Conceptual frameworks and design processes in the textile print and related industries were reviewed. This is to underline the structure/s and/or style/s of frameworks adopted or developed by these studies. Scimago portal stating journals from the data available in the Scopus® database- was used to find out the TEXTILE or DESIGN journals that could be reviewed and referenced in this study. The journals well-established in the field of textile research such as Textile Research Journal, Journal of the Textile Institute, Clothing and Textile Research Journal, and Research Journal of Textile and Apparel were reviewed employing various keywords including Conceptual Framework, Methodology, Design Process, Product development, design thinking. In design Journals, the search keywords included the word “Textile” because it was intended to focus on textile-related industries, especially print.

Second Phase: For each paper reviewed, the researcher focused on obtaining the method adopted in managing the design process from start to end. Then the processes employed were highlighted through discussion and analysis. Moreover, these methodologies and frameworks were illustrated using smart charts or diagrams whenever this was found useful for a clear demonstration of the discussed framework.

Third Phase: After examining the reviewed and discussing the frameworks, the Identification of similarities and differences between them are highlighted.

Fourth Phase: Finally, the conclusion is extrapolated to conclude whether designers of textile print designs or textile printing projects would employ a general unified framework for the design process of their projects or should each design project should have its framework in terms of the design processes

conducted. In case a unified one would be adopted in most design projects. The conclusion will illustrate its structure.

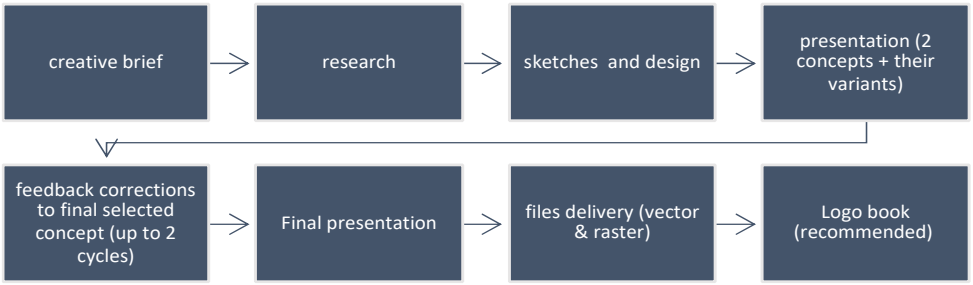
3. Results

Design frameworks have been the interest of both designers and design researchers/academics. This is due to the advantages of understanding and applying these frameworks on academic and professional and business levels (Mazzarella et al., 2021). Therefore, this topic has been found discussed not only in specialized journals but as well in design magazines and online articles.

According to a visual presentation created by Nezhynska (2020) titled "How designers work" it would be considered a design framework in which the following stages were considered in logo design and UI design processes. These were creative brief, research, sketches, and design, presentation (2 concepts + their variants), feedback corrections to a final selected concept (up to 2 cycles), Final presentation, files delivery (vector & raster) Logo book (recommendation). Figure 2 shows an example of a graphic design framework.

Figure 2

An Example of Graphic design framework



Source: Nezhynska, 2020

Parsons & Campbell (2004), and Nhelekwa et al., (2022) investigated the new technology's impact especially digital textile printing on creativity in the design process. Four stages of the design-making process were addressed in implementing various apparel products. These are Problem Identification, Conceptualization, Prototype Development, and Solution (see Figure 3). One of the main advantages of applying new technology was found to enable the designers to be phase-oriented i.e., problem identification or conceptualization rather than sub-problems focused. This is due to the better command of the technology used (Parsons & Campbell, 2004).

Figure 3

Main stages of apparel design approach

Source: Parsons and Campbell, 2004

In 2019, Pamungkas discussed in his article "Growing up your design career: How should a designer work" three main phases of design making process. These stages were based on input, process, and output which is a commonly applied method in schemes' analysis of configurations and structures.

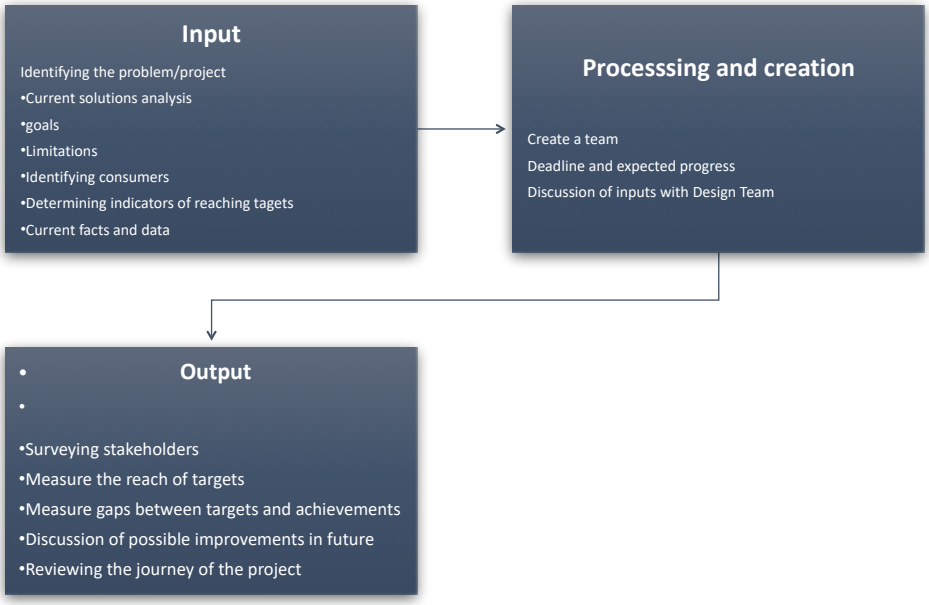
It is evident from the framework created by Lamb & Kallal (1992) that consumer needs are the core of a conceptual framework construction. This means that the analysis of the targeted consumer should be at

the start and last stages of the creation process. Therefore, it was suggested to make a consumer profile including analysis of details such as gender, age, physical characteristics and preferences, and cultural context. This is in terms of the Functional, Expressive, and Aesthetical aspects. The functional criteria convey its utility such as comfort and thermal functions, Expressive aspects focus on reflections of the consumer's personality, beliefs, and background on designs selected, and finally, Aesthetic features highlight attitude and preferences towards design elements and principles. Moreover, there are inter-relationships between all these three main aspects and their elements which have been studied by researchers independently and mutually. A balance between these aspects is considered by consumers based on their priorities.

Consumer needs are to be tested and measured for fulfillment at the first stage i.e., problem identification and evaluation before the last stage i.e., implementation. Researching ideas for design solutions is the second process which is inspired by primary data collection tools and methods and creative thinking techniques. The design is then developed to be finalized before making a prototype. In the prototyping (first version/sample making) stage, technological processes and standards are considered. An Evaluation process takes place to assess the fulfillment of the criteria set. Later on, the production process is launched (Lamb & Kallal, 1992). For mass production considerations, marketing, and merchandising might affect the design criteria. It is stated that the FEA model is proposed to be sufficient to determine consumer needs (See Figures 4 and 5).

Figure 4

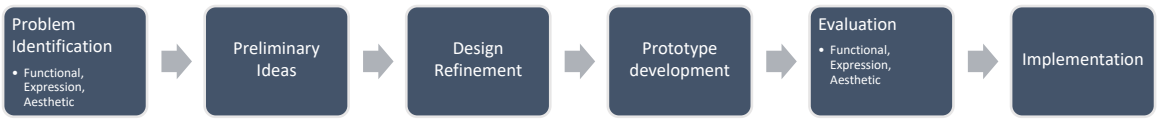
Examples of steps employed in the design framework



Source: Pamungkas (2019)

Figure 5

Design framework



Source: Lamb & Kallal, 1992 (includes FEA consumer needs model)

The conceptual framework studied in this paper has been investigated and tested for use and applicability on two textile printing design products. Possible processes used in making and implementing these products will be discussed based on experts and professional experience. FEA Consumer Needs Model developed by Lamb & Kallal (1992) was analyzed by Orzada & Kallal in 2016 and found in terms of clarification of employing this model beyond an initial evaluation of design criteria. It was found that several researchers who studied this model focused almost on the initial needs of consumers in terms of FEA rather than on later stages in the design process.

Orzada & Kallal (2021), reviewed the research studies conducted applying Lamb and Kallal's framework across 25 years in terms of applying the FEA model and Integrated Apparel design framework. These were applied successfully in different forms to recognize consumer essentials, update the design development, endorse the efficacy of the model, and validate the power and suppleness of the FEA Model. It was found that The FEA Model has been functional for products other than apparel. consumer/ user. Therefore, this raised a question about the possibility of applying this model in guiding designers in making consumer products. Moreover, this point was positively supported by the research studies. Testing this model on different products was suggested.

The printed Textile design includes a range of products that would be classified into two main types in terms of repeat to one piece/ one repeat and repeat/pattern. These design specifications are affected by the type of fabric and the expected final product. These designs for mass production would be implemented using several techniques including Silkscreen, Digital inkjet printing, and Transfer Printing.

Printed Textile design has significant nature of technologies that can be used in the implementation. This is highlighted by Gürcüm (2017), in the paper "Conceptual design method and Creativity in textile design". Therefore, designers in this field should consider the technological aspect of production and materials specifications while designing. Conceptual design principles were explained and mapped. Starting from problem identification, collecting data and research, ideation, and their design in the field of textile design. The negative impact of the researcher's view was that it didn't provide suggestions for quick design solutions for the collections developed throughout that investigation. Conceptual design methods can be applied.

Studd (2002) discussed procedures conducted from start to end of textile design projects and summarized a comprehensive model by studying several case studies in different design firms. Design projects start with a starting point then a briefing is made to study and analyze the design problem, this is followed by generating ideas to select the best solutions, repeat is then applied and used to make collections. The initial evaluation is conducted on initial samples to be presented to the client to be produced once the designers get the client's approval. Figure 6 shows the sequence of design processes discussed and set by Gürcüm (2017).

Figure 6

Sequence of design processes

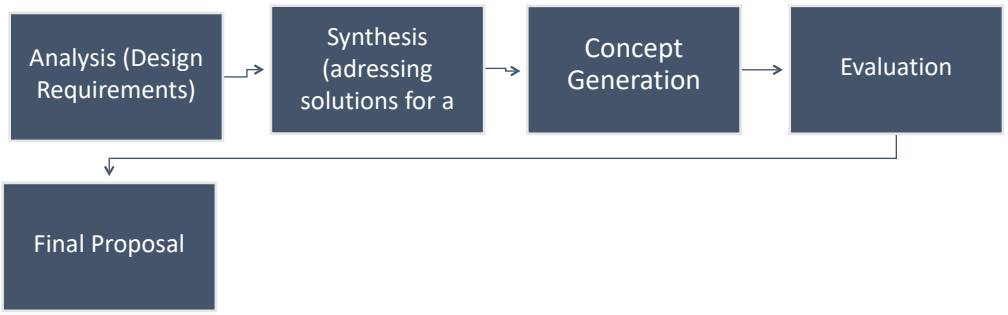
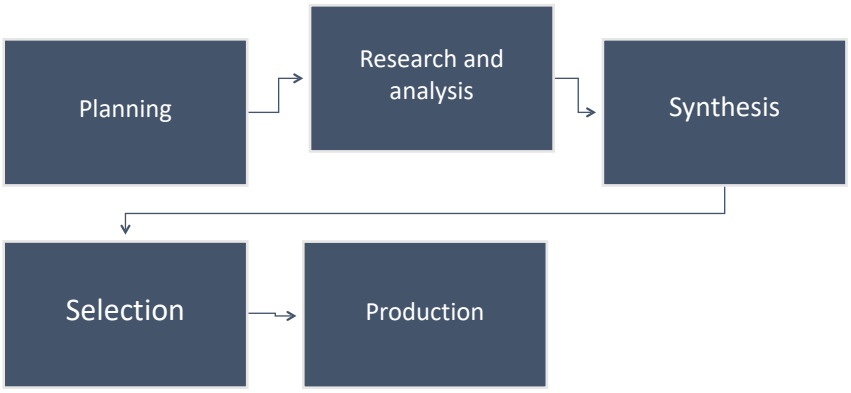


Figure 7 shows the generic framework for textile design stated by Studd (2002).

Figure 7

The generic framework for textile design



Bisson et al. (2022), developed a conceptual framework for professional training in the textile industry. The stages considered by them were as follows: Needs analysis, conceptual design, detailed design/solution, implemented product, and finally consumer feedback after use (See Figure 8).

Figure 8

The conceptual framework developed for textile industry professional training

Perry & Towers (2013), Wu et al., (2022), Eyasu & Endale (2020), and Gardetti & Larios-Francia (2021) investigated the inhibitors and drivers of Corporate Social Responsibility in the garment industry supply chain. Hawley (2006) developed a conceptual model that illustrates the categories of reclaimed textile products suggesting the relationship type between goods value and volume i.e., inverse. They indicated that in the textile market, there has been a continuous search for possible benefits from available products in the landfill. Powell & Cassill (2006) investigated processes and practices adopted in new product development NPD for textile products and materials produced by 24 companies based in the USA. The Crawford and DiBenedetto model were used as the conceptual framework. The study found that NPD processes are used in combination and as a competitive advantage in the market.

4. Conclusions

This study discussed several design frameworks developed from different design fields and focused on the textile design area. The Comparison between the studied frameworks, models, and design flows shows that although they use different terms of similar meanings and range, all of them have three main stages these are input, processing, and output. All of them are based on conducting research and analysis of the design problem. Consumer needs affect the design project limitations. The frameworks investigated were found to employ an evaluation process against criteria. It is noteworthy that the criteria of assessment and the stage of which the evaluation using criteria would vary according to the model or framework used. It is believed that the usability of the technological tools available such as computer software and machines should be highlighted in the design management framework. Therefore, it is recommended to be considered in the targeted comprehensive conceptual framework. There were found similarities between discussed and investigated models. Differences found were in comprehensiveness and suitability for definite fields of design.

The FEA Consumer Needs Model was found to represent and be used beyond the first assessment of design criteria for their consumer/user. A functional aspect includes comfort, fit, ease of care, safety, and durability. The expressive aspect involves traditional practices, individuality, originality, and visual, and nonverbal cues, sending clear, consistent universal messages, and perception of beauty, however, the aesthetic aspect considers the visual components design elements, and principles. It was clear that these aspects of the FEA model should be considered by designers in various fields and would support targeted consumer needs. The conceptual frameworks investigated in this study and developed in the apparel design area are suggested to be applicable in the field of printed textile design of different forms.

Technological aspects and tools are believed to be essential starting points in design projects, especially in printed textile design. This aspect is as important as the FEA model identifying consumer needs. This is because it limits implementation potentialities which might affect the design approach. The researcher agrees with previous researchers who called for the necessity of developing a model organizing the design process and the vitality of its use by design students and specialists with more clear details to accommodate a wide range of various products changing continuously in terms of specifications. This framework is suggested to fill the gap of any misunderstanding or ambiguity in the professional field. It is realized that there is a need for a broad-spectrum framework that would be applied to design products that would be used by students, researchers, and professionals. This model will integrate all/most items included in the design process and would present an integrated framework for textile design. It is proposed that this framework could be applied to all types of textile design because it considers various aspects of technological considerations and styles.

This study investigated the conceptual frameworks managing the textile design industry. Therefore, it was concerned with analyzing and comparing existing ones developed by previous research studies. Moreover, this study has recommended a generic conceptual framework to be adopted by textile design specialists, designers, academics, and students. In future research work, the author plans to practically examine the proposed concluded framework and other frameworks by various companies, colleges, and studios varying in size applying different types and natures of design projects. This is to examine the viability of the proposed framework and validate it practically by practitioners

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