JPB JURNAL PENGABDIAN BANGSA

Vol 2 No 2 Agustus 2023

ISSN : 2964-1772

APPLICATION OF THE CONCEPT OF TRANSFORMATION GEOMETRY TO THE DESIGN OF THE BPKP EMPLOYEE AWARD CHARTER FOR ACEH REPRESENTATIVE

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ABSTRACT

Design or planning is a process of planning and creating a new object that is carried out by paying attention to various aspects including beauty, symmetry, and aesthetics as well as various other aspects . The design process can also be called visual problem solving that includes organizing, creating, and evaluating to produce a desired work . An award certificate is a medium that contains writing in the form of an official statement and is used as a form of appreciation for someone's achievements or accomplishments. An award certificate is created through a design planning process first, where all ideas are conveyed through the creation of objects in the design. In designing a certificate design, the concept of transformation geometry can be applied to obtain changes in position and presentation based on several types of transformations, so that a design will be produced that suits the needs and desires. The types of transformation geometry used include translation, rotation, reflection, and dilation. This transformation geometry concept is utilized in designing and determining the design of the certificate to be given to outstanding employees of the BPKP Representative Office of Aceh.

Keywords *:* Design;Charter;TransformationGeometry ***;*** Rotation; Dilation.

A. INTRODUCTION

Design is concerned with the formulation of a concept, design pattern, framework, pattern, and design style that are implemented on an object, and is a tool for the process of creating a particular object. Through a design work , a designer can convey their ideas or creative work to the wider community. Design also serves as a platform to present the appearance of a particular object to the public, reflecting its true image (Thabroni, 2019).

Design can be applied to the creation of a charter or certificate of appreciation to be given to a deserving individual. A charter can be defined as a document that recognizes the achievements of an individual or group and is given as a form of appreciation for those achievements. An example is the awarding of recognition to a deserving employee based on their performance and outstanding achievements .

Implementing new innovations. Designing award certificates can be made easier by using geometry, a branch of mathematics.

Geometry is a branch of mathematics that encompasses the concepts of points, lines, planes, space, their dimensions, and other properties. In the design process for award certificates, geometric concepts, namely transformation geometry, can be applied. Transformation geometry is a branch of geometry that encompasses transformations (changes), both changes in position and presentation based on images and metrics. Types of transformations include translation (shift), rotation (rotation), reflection (reflection), and dilation.

The use of transformation geometry is utilized to multiply existing objects in the design, form objects in the design in reverse, side by side, and objects that can be enlarged/reduced with the same pattern and different sizes. In the application of dilation transformation, the concept of vectors is used in the design of the charter design so that the objects obtained later do not depend on the resolution, so that the shape and size of the object can be changed without having to reduce the graphic quality.

This transformation geometry concept is utilized in designing and determining the design of the charter for the needs of the employees of the Aceh Representative of the Financial and Development Supervisory Agency (BPKP). The working area of the Aceh Representative of the BPKP covers one provincial government and 23 district/city governments. BPKP is a non-ministerial government institution tasked with carrying out government duties in the field of development and financial supervision, in the form of audits, assistance, consultation, eradication of KKN (Corruption, Collusion, and Nepotism), evaluation, as well as education and training for supervision in accordance with applicable regulations in order to encourage the realization of good governance.

B. METHOD OF MONEY ASSESSMENT

This community service will be carried out from December 5, 2022, to December 30, 2022, at the Aceh Representative Office of the Financial and Development Supervisory Agency (BPKP). This activity involves designing a charter, starting with collecting data in the form of geometric shapes to be used in designing the charter. The design of this charter uses the concept of transformation geometry, which includes reflection, translation, dilation, and rotation, which will be used as a form of appreciation for the employees of the Aceh Representative Office of the BPK.

C. RESULTS AND DISCUSSION

The following is the design and form of the first charter that practitioners have researched based on its form and graphics:

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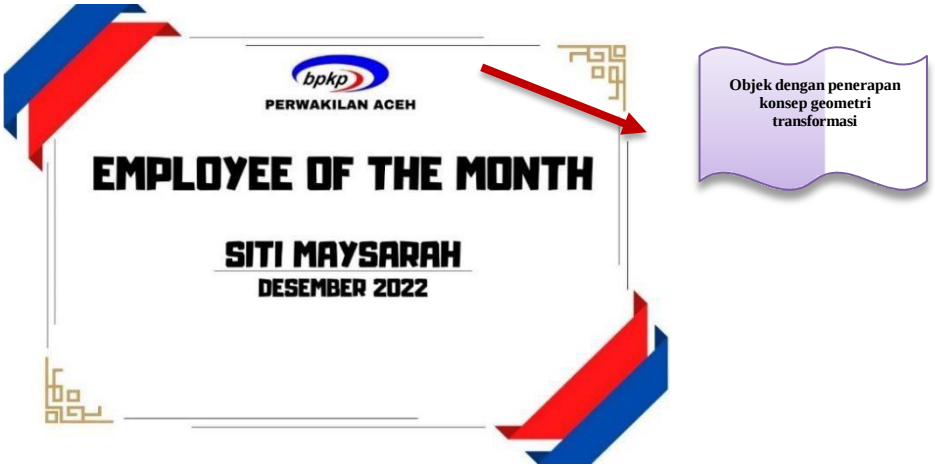

Figure 1. Design 1 Award Charter

The following is the application of the transformation geometry concept to one of the objects when designing the first design of the award certificate for the best monthly employees of the BPKP Aceh Representative:

Figure 2. Initial Object in the First Design

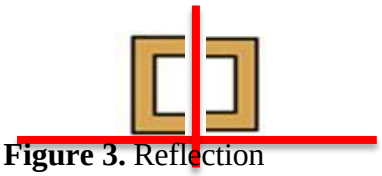

Figure 3. Reflection

Based on Figure 2, the initial object is formed from a combination of straight lines with the resulting object of the combination being able to be reflected or mirrored to produce a new object as seen in Figure 3. Reflection is the process of reflecting each point of a geometric object to a certain line, reflection can be applied when the object is on the x-axis = 0. If a geometric object/shape is reflected to a certain line, then the image object/shape is congruent with the original shape. Applying reflection transformation to a certain object can produce a new object that is complete and beautiful, namely by combining objects obtained from the reflection transformation process. The following is an object resulting from combining reflection transformations:

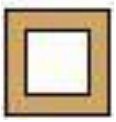

Figure 4. Combined Mirroring/Reflection

A transformation that rotates/moves each point on an object by a certain angle , the angle clockwise is negative (-) and

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which is in the opposite direction has a value (+) is called Rotation/rotation. This transformation does not change the size or shape of the object, but only changes the position of the object. A rotation is mathematically defined as a mapping that satisfies for any plane a, for example a rotation about point J with an angle , symbolized by can be seen in Figure 5.

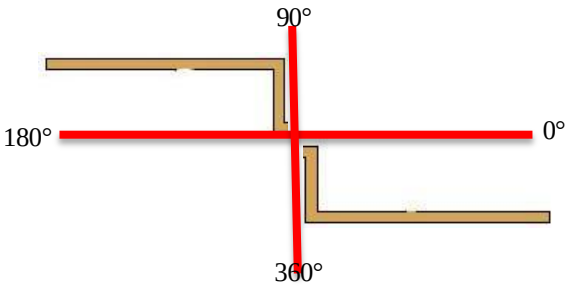
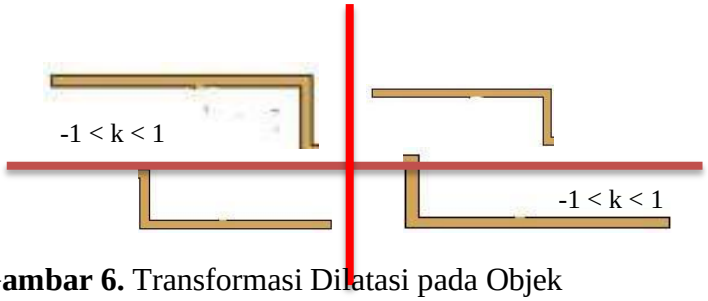


Figure 5. Rotation/rotation of an object

Figure 5 is the application of rotation to an object, the object is rotated at an angle of 180°, then shifted to the desired position, the application of this transformation makes it easier for practitioners to multiply objects in the design without having to change the image.

Dilation is a transformation of an object, namely reducing or enlarging an object without changing the existing object. This transformation changes the distance of points by a certain multiplier factor to a certain point to a certain point without changing its direction, but rather changing the size of the object (enlarged or reduced). The factors that cause an object to be enlarged or reduced are called scale factors or symbolized by k as follows:

1. If $k > 1$ or $k < -1$ then the object is enlarged
2. If $-1 < k < 1$ then the object is reduced
3. If $k = 1$ or $k = -1$ then the object does not experience a change in size. In objects in the design, the object experiences a reduction in size.



Gambar 6. Transformasi Dilatasi pada Objek

In designing the charter, the concept of geometric transformation is applied to facilitate the formation of objects, thus producing new objects. The use of rotation/rotation transformation can form objects in reverse , and dilation can form objects in an enlarged or smaller size.

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shrinking with the result that the same object has a different size . The following is an example of an object resulting from the application of dilation and rotation transformations:

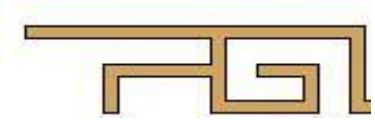
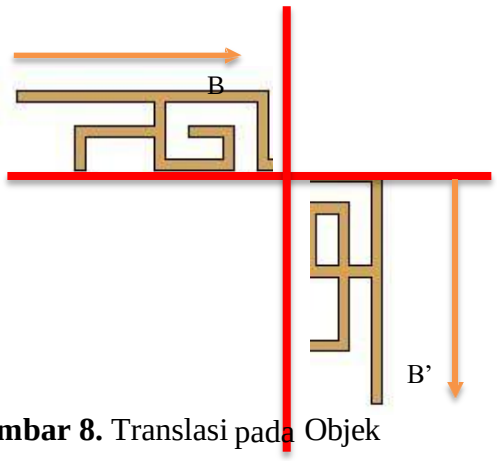


Figure 7. Object with Dilation and Rotation Transformation

To obtain the same object in a different position, a translation/shift is performed by moving all points on the plane by the same distance and in the same direction. If there are two points, for example points A and B , then if points A' and B' are the result of the shift, then $\rightarrow\rightarrow\rightarrow\rightarrow$ = $\rightarrow\rightarrow\rightarrow\rightarrow\rightarrow\rightarrow\rightarrow\rightarrow$, where $\rightarrow\rightarrow\rightarrow\rightarrow$ is a vector (directed line segment). A vector is geometrically described as a directed line segment, where the length of the line indicates the magnitude of the vector while the direction of the line indicates the direction of the vector, as seen in the following illustration:

The results of the shift/translation can be seen in Figure 8.



Gambar 8. Translasi pada Objek

In designing the charter design, the concept of transformation geometry is applied to facilitate the formation of objects as desired and can produce new objects. The use of shifts in creating objects in the charter design makes it easier to multiply objects with different positions, dilation can form objects that are enlarged or reduced with the result of the same object with different sizes , mirroring can form the same object simultaneously .

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side by side, and rotation can form objects in reverse (Fitriyah et al., 2018) .

The following is an example of an object resulting from the application of transformati

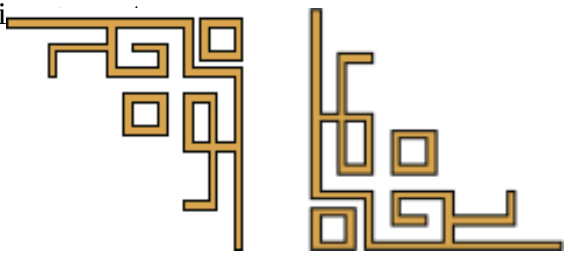

Figure 9. Application of Transformation Geometry to the First Design Object

Next is the design and form of the second charter that has been studied. based on its shape and graphics:

Figure 10. Design of 2 Award Certificates

The following is the application of geometric transformations to the second design draft for the 2022 BPKP best monthly employee charter:

Figure 11. Initial object in the second design

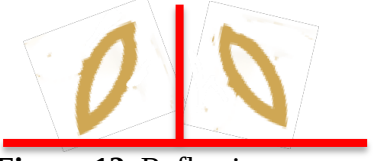

Figure 12. Reflection

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Reflection is a transformation by moving each point on a plane using the mirror image properties of the moved points. Reflection of a geometric object/figure is the process of reflecting each point of the geometric object/figure on a certain line, reflection is applied when the object is on the x-axis = 0. In mathematics, reflection is defined that reflection on the line s is a determination that satisfies for any A in the plane T applies as follows:

∀ A = P

[B, where s is the AB axis , if A is not in s

Applying a mirroring transformation to a specific object can produce a new, complete object. After being reflected and combined, the reflections transform into a flower shape, as seen in the following image:

Figure 13. Co ion Results

Changing the position of an object by rotating it around a certain center and angle is called rotation. In general, a rotation of a clockwise angle around the center O (0,0) is

P (x,y) ⧫□ P ' (x cos θ + y sin θ , y cos θ – x sin θ

The following is an application of rotation on an object, the object is rotated at an angle of 180°, then shifted to the desired position , the application This transformation is used to multiply objects in a design without having to change the image/object (Paradesa, 2016).

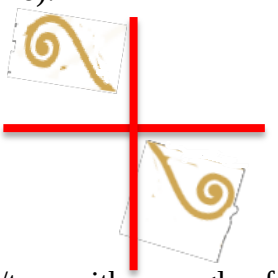

Figure 14. Rotation/turn with an angle of 180°

Combining reflection and rotation transformations will produce new objects with more beautiful shapes. Here's an object with reflection and rotation transformations applied:

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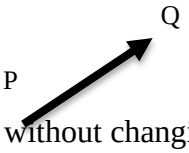
Figure 15. Objects of the reflection and rotation transformation process.

Translation/shift is a transformation that is carried out to obtaining the same object in different positions by moving all points on the plane the same distance and in the same direction. Consider the following vector image:



The object will experience a shift without changing its size, so that object P will be obtained, then shifted by a certain number of units so that P' is obtained, and so on until an object is obtained as in the following image:

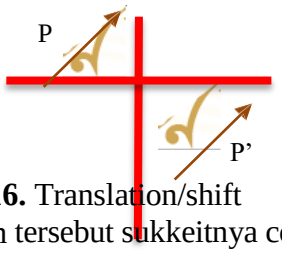


Figure 16. Translation/shift

Dalam deisein desain piaga m tersebut sukkeitnya concept

Transformation geometry facilitates the creation of precise objects. The use of shifts in object creation in charter design facilitates the multiplication of objects in different positions. Rotation can create objects in reverse, mirroring can create identical objects side by side, and dilation can enlarge or shrink objects, resulting in the same object at different sizes (Kurniasari, 2021). The following is an example of an object resulting from the application of transformation geometry:

Figure 17. Apı the Second Design

Object In determining and designing designs for the charters of the Employees utilize the concept of transformation geometry, namely dilation, rotation, translation, and reflection. Transformation geometry is used for formation, arrangement, and presentation so that the formed object will look beautiful when placed in the design (Yanti & Haji, 2019). The result of utilizing the dilation concept is that the formed object can be multiplied with the position

different, rotation is used to obtain the shape of an object by turning it around at a certain angle, reflection is used to obtain the same object side by side, and dilation is also useful in enlarging or reducing objects of different sizes.

D. CONCLUSION

Designs for the award certificates for BPKP Aceh Representative employees have been designed by utilizing the concept of transformation geometry, namely dilation, rotation, translation, and reflection. Transformation geometry is utilized for the formation, arrangement, and presentation so that the objects formed will look beautiful when placed in the design. The result of utilizing the dilation transformation concept is that the objects that have been formed can be reproduced with different positions, rotation is used to obtain the shape of the object by turning it around at a certain angle, reflection is used to obtain the same object side by side, and dilation is also useful in enlarging or reducing objects with different sizes. The use of the vector concept in designing this charter design functions so that the objects obtained will have high resolution, so that changes in size will not affect the graphic quality.

E. ACKNOWLEDGMENTS

The author would like to thank all the employees of the Aceh Representative Office of the Financial and Development Supervisory Agency (BPKP) who have given the author the opportunity to apply mathematical knowledge in designing the award certificate at the Aceh Representative Office of the BPKP.

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