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Understanding the Morphological Evolution of Armenian Churches in New Julfa and its Interaction with the Architecture of Isfahan*

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Abstract

Problem statement: Today's country of Armenia, a part of the ancient Urartu, as the first land that officially accepted Christianity, has built the oldest churches and has turned the old temples into churches. By the Armenians' migration to Isfahan and, simultaneously, the establishment of the New Julfa during the reign of Shah Abbas the Great, the churches appeared in a different form. The construction of churches benefited ancient experiences whilst taking into consideration the Shah's decree that new constructions should not conflict with the capital's buildings. It seems that the previous studies on the New Julfa churches have not paid enough attention to the architectural and the cultural relations of the new context. Understanding the process of convergence between the Armenian religious architecture in New Julfa and the architecture of Isfahan, and its results could be applied in urban restoration and regeneration projects, especially in the Julfa neighborhood, which specifies the necessity of this research.

Research objectives: The current study aims to find out the morphological transformations of the physical-spatial structure of the main building of churches in New Julfa, considering the interaction between the architecture of New Julfa and Isfahan's prominent architecture. The study tries to answer these questions: Which type is generative and the initiator of the progress of church building morphology? How the architecture of the main building of churches has been converging toward the prominent architecture of Isfahan within their morphology evolution process?

Research method: The research is carried out using an interpretive-historic method and the data is collected according to available documents and field observations.

Conclusion: The outcome of the research implies the principle of some kind of restriction in the form of the Armenian church building. The existence of a generative type and getting influenced by the architectural techniques of the Shah Abbas period is confirmed in the course of formal evolution. Compared to the Isfahan prominent architecture of this period, the morphological changes of the main building in the churches are indicative of a tendency to converge to the Iranian style. The St. George Church is the first church building with the features of Iranian architecture, which provides the possibility of subsequent physical-spatial developments. The physical-spatial structure of the church of Holy Mother of God and the Bethlehem church is comparable to the structure of Sheikh Lutfollah and Abbasi Jame' mosques, which indicates how the physical-spatial structure of the generative type developed.

Keywords: *Morphology, Type, Armenian Churches, New Julfa (Julfa of Isfahan), Architecture of Shah Abbas the Great Period.*

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Introduction

Today's Armenia, a part of the ancient Urartu, was established by the large migration of Aryan Armenians who settled down in the southwest of Lake Van; the first land officially admitted Christianity built the oldest churches and transformed the old temples into the churches. Compulsive emigrating of Armenians from Armenia to Iran at the time of Shah Abbas the Great, and Developing of Isfahan at the same time formed the New Julfa in the south of Zayandeh-Rud. In this process, the will of Shah Abbas on one hand and the coincidence of developing projects of the Safavid capital, on the other hand, contributed to the integrity of the landscape of New Julfa and Isfahan.

The construction of all existing Armenian churches, which took place about over sixty years¹, was evolved in accordance with certain rules and got influenced by the architecture of Isfahan. Studying the process of converging the religious architecture of the Armenians in New-Julfa to the prominent architecture of Isfahan is a step to recognize the interaction between the architecture of New-Julfa and Isfahan. Therefore, the conclusions drawn from this research could be considered in urban restoration and regeneration projects, especially in the New-Julfa neighborhood. The purpose of the study is to investigate the physical-spatial structure² of the main building in the New Julfa Armenian churches within interacting the Safavid architecture. The research seeks to answer how the morphological evolution of the main building of the Armenian churches proceeded in New Julfa. Which generative type³ initiated the progress of the physical-spatial structure of the church main building? How the church architecture has been converging toward the prominent architecture of Isfahan during Shah Abbas the Great period?

Theoretical foundations

• Typo-Morphology

"It is essential to create categories in order to understand the various and diverse incoming information and it seems that the public already have a cognitive image of any known object, which is overlapped with many

individual memories" (Kwun & Whang, 2011, 11). The typology studies that emerged in the eighteenth century were introduced in two different "functional" and "formal" approaches, respectively, by two architects, the Durand⁴ and Bullee⁵ in the first half of the nineteenth century (Petruccioli, 1998, 9-11)

"Durand's writings offer one of the earliest formulations of the concepts, composition and type that were to guide the teaching of the Beaux-Arts until it collapsed under the onslaught of modernity" (Picon, 2000, 2). Categorizing the two kinds of "public" and "private" buildings, Durand (2000, 77) divided them into "a great number of types, and each type is capable of an infinity of modifications".

His method consisted of three steps: the "study of architectural elements", "the assembly and conversion of these elements into systems", and finally, "the adaptation of a formal scheme to a designed use" (Petruccioli, 1998, 9). Durand discussed "the elements of buildings", including "walls, doors and windows, arches" and supports (such as "pilasters, columns, and piers"), also "various materials that may enter into their construction", then "he examined how to combine the objects of composition and how to dispose them in relation to each other, both horizontally and vertically". Various combinations form different parts of the building. "Finally, going on to combine the different parts of buildings", he "came to the composition of the whole in general" (Durand, 2000, 132).

On the other hand, "Boullée believed that memory had educational value for a budding post-revolutionary society", and "historical forms can communicate the shared values of both the designer and the society - thus he emphasized on *venustas*" (Petruccioli, 1998, 10).

In the 1950s, "three schools in Europe began to elaborate theories," trying to understand "the built environment and the relation between their elements". Having "differences in using the notion of the typology" established in chronological order, the Urban Morphology Research group of the University of Birmingham, inspired by Conzen, the Italian

school rooted in the Muratori's theory and the French Versailles School (Petruccioli, 1998, 11-12). The typomorphological debates in these three schools clarify the use of type in design theory. Schools differentiate between generative and descriptive, analytical and critical types and are capable of conceptual separation (Moudon, 1994).

"In the 1960s Argan⁶ provided the theoretical support for the idea of formal typology or morphological memory present in Boullée's work, by elaborating type is deduced a posteriori. The birth of a type is conditioned by the fact that a series of buildings share an obvious functional and formal analogy among themselves. In the process of comparing or selectively superimposing individual forms for the determination of the type, the identifying characteristic of specific buildings is eliminated and only the common elements remain which then appear in the whole series" (Petruccioli, 1998, 10). The type for Argan is a "formal scheme", a "mold for further reproduction that can be recognized in history" (Petruccioli, 1999, 7). "Type is depicted as a scheme deduced through a process of distillation from a group of formal variants to a basic form or common scheme" (Petruccioli, 1998, 10).

"The main legacy of the sixties is the work of Muratori⁷, who envisaged a type historically grounded and a priori", which had two major consequences:

1. "If the type exists in people's minds before they build, it is the most effective expression of the collective memory. In fact, Muratori exalted this participation, this ethical and core value of the building versus major architecture."

2. "The corollary was that if the type is the expression of the life of people, it changes in time and space, therefore that idea of the process, is the most progressive contribution of Muratori. Unfortunately, Muratori's intellectual construct was universally rejected for political reasons in the 1960's"

"The Muratorian idea of the typological⁸ process also envisioned a method of design in which analysis and design were conceived too much in continuity" (Petruccioli, 1999, 7).

Research background

Changing policies of Supervisory institutions On churches (Garai & Vukoszávlyev, 2017; Stroik, 2015), evaluation of spatial organization of the churches using their typology in the region (Panjikaran & Vedamuthu, 2013), using church architecture as a language that represents the human attributes of believers (Sovik, 2009), revision of design style (Repelewicz & Madurowicz, 2016), typology of Armenian churches in Tehran (Simoni & Hojat, 2016), the geography of the old architectural elements of the church building (Currie, 1990), investigation of proportions and constructional tracing in Byzantine churches based on the metric systems of the Byzantine and the Ottoman period (Oikonomou, 2012) are the varieties of extensive studies on the spatial structure and organization of churches in Iran and the world.

Greenwood (2008), explained the deep and prolonged influence of the Sasanian Persia on the Armenian churches, also, Maranci (2015) described the status and estimated date of the three churches in Armenia, Mren, Zvart'nots⁹ and Ptghni¹⁰, using various architectural elements of building structures and their formation in relation to the government of the time. From Maranci's viewpoint, the mentioned churches, indicate a dynamic dialogue between imperial and local constituents, promoting individual professionals and princely families, and sharing cultural horizons (Avdoyan, 2017). Javadi (2014) verified the continuity of Caucasus "Mithra" architecture's signs and remnants in the churches of Armenia and Georgia.

In Iran, several historical studies have been carried out on the churches of the Azerbaijan provinces (Khanmohammadi, 2005; Shoja'del, 2005a; 2005b; Haghazarian, 2015; Simoni, 2010; Hovsepian, 2004; 2015). The researches by Haghazarian (2006) and Carswell (1968) on the churches and buildings of New Julfa are valuable resources. From the Iranian scholars' viewpoint (Avdoyan, 2000; Shoja'del, 2007; Hovsepian, 2007; Haghazarian, 2006), the impact of the church's architecture in Iran of the special architecture of the new land, representing the architectural influence of techniques and technology

related to the geographic and climatic location of the regions, also, the uniqueness of New Julfa churches in relation to the former churches of Iran, are mutual mentioned facts.

Research method

The research is carried out using an interpretive-historic method, in addition to analyzing the historical documents, field observation has undertaken. These tools made the identification of the physical-spatial structure of the Armenian church of New Julfa, practicable. The unique and common features of the main building of the churches were identified in relation to the factors affecting the physical-spatial. During the Shah Abbas the Great period, different types of churches were formed as a result of the interaction of architecture and urban thoughts on the development of Isfahan as the capital. The impact and the process of the morphological evolution of church buildings is demonstrated by comparing the similar characteristics of the components and the structure of the churches to prominent buildings of the same period. In the chain of change and continuity of the characteristics of the physical-spatial structure of churches, the generative type is identified, then, in accordance with the understanding the origin and, the process of physical changes, also considering the spatial and structural proportions of the architecture of Shah Abbas the Great period, the convergence of the churches' architecture to Isfahan architecture is revealed.

General characteristics of Armenian churches' architecture

Armenians who were Iranian partners and supporters in 6-5 century B.C. and had a prominent position in Iranian society (Gellhardt, 2017, 19), in the field of religious architecture used high-quality materials, advanced techniques of arches and domes. Sassanid churches are mostly found in neighboring countries, and the history of most Armenian churches dates back to after the Sassanid era (Reuther, 2008). At the church of Mren (640 A.D.), the Sassanid pendentives (Fig. 1)

are visible (Maranci, 2014). Choisy (2007), Reuther (2008) and Ching, Jarzombek & Prakash (2006) described a type of church with a central structure in the plan, which was built in Armenia and Byzantine territory. Choisy introduced a specific Armenian type, consisting of a long stem, with a conical dome in the external view and, an internal dome in order to cover the ceiling with pieces of flattened-surface stones in the simplest possible way, which has crossed to other places including Iran in the Seljuk period and beyond. Melkomyian (2001) and Choisy (2007) believe that churches with a dome have been considered after the abandonment of the concept of nave-shape churches. Melkomyian (2001) considered the possibility of Iran's influence on the Armenian stone dome due to the grandeur of the Sassanian domes at the time. Upjohn, Mahler & Wingert (2011) have confirmed the influence of Sassanian domes on the Byzantines. Building dome in the Sassanian and Byzantine periods was an architectural occasion, also, essential for the wealthy and powerful states that had used this element in their magnificent building before being used in religious buildings. According to Upjohn et al. (2011), the Byzantine architecture of this type of dome, with the enormous mass that covers most of the space,

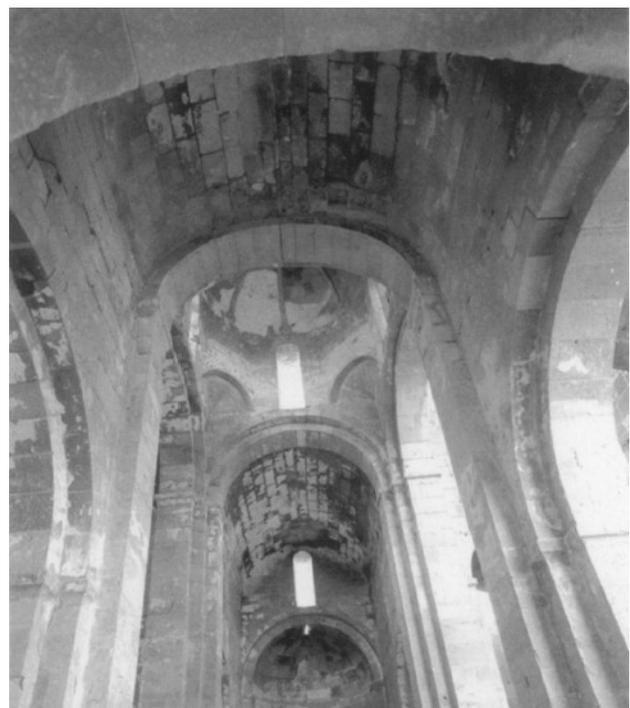


Fig. 1. Mren Church (640 a.d.) in eastern border of Armenia, Sasanid Pendentive. Source: Maranci, 2014, 65.

adapted to the churches of this age.

The oldest one-nave buildings are in fact the temples of Mithra, which turned into churches after Christianity. The use of arches and domes, also the nave space, have been applied with the developed method in the churches of Armenia. Zander (2007), Godard, Godard and Siroux (1988) and Reuther (2008) consider the quad column, quad arch, and dome-style as a legacy of the Sassanid Empire and Zoroastrianism. During the Safavid period, interventions and reforms in piers made them lighter and hollow.

In “1700 years” history of the construction of Armenian churches in Iran (Hovsepian, 2004), the two oldest monasteries of Azarbayjan region, St. Thaddeus the apostle (Qara Kelisa), and St. Stepannos Nakhavka are the most prominent churches that have been damaged and restored throughout the ages. (Fig. 2) (Haghnazarian, n.d.). During the Qajar period, with the support of Abbas Mirza, the western part of the St. Thaddeus church was changed to the architecture style of the Etchmiadzin church (Hovian, 1967; Haghnazarian, n.d.; Arakelyan, 1996; Afshar Sistani, 1996; Hovsepian, 2004).

Factors influencing the building forms during the development of the capital’s center and New Julfa

The simultaneity of the projects and the rapid construction procedure of the Safavid capital’s buildings provide an opportunity to interact and link architectural and urban planning and their impact on each other. McChesney (2006) has identified

certain manpower in simultaneity and multiplicity of projects as important contributors to the coordination of designs. Some sources approved the trace of prior patterns in the same functions in the Safavid period. Afoushta’ei Natanzi (1994) mentioned that the pattern of Isfahan Bazar has taken from the Tabriz Bazar plan. Also, Alen¹¹ believes the regular Chaharbagh gardens of Isfahan are affected by Herat Timurid gardens where Shah Abbas spent his childhood (Walcher, 2001, 339).

• The influence of inner-structural factors of church’s building

The laws, functions, communications and the contributions of the people and the nobles, as well as the architectural patterns carrying a long history of Armenian communication within the pre-emigrant settlements, constitute the inner-structural contributors to the church’s building. A document presenting the Armenian church building formality illustrates several positions where hallowed stones were installed in remembrance of Christian Apostles (Melkomyian, 2001) (Fig. 3). The specific key positions include the two sides of the entry and altar, each corner, also the division of the transverse spans. The key positions are in line with the formal characteristics of New Julfa’s churches. The hallowed stones define the boundary, the shape and the area of the church space. The interior space in the general structure of the Armenian churches is divided into the main hall (public space), the space for the priest sermon and choir, and ultimately, the altar at the eastern end of the building. The main entrance is usually located on the west side,

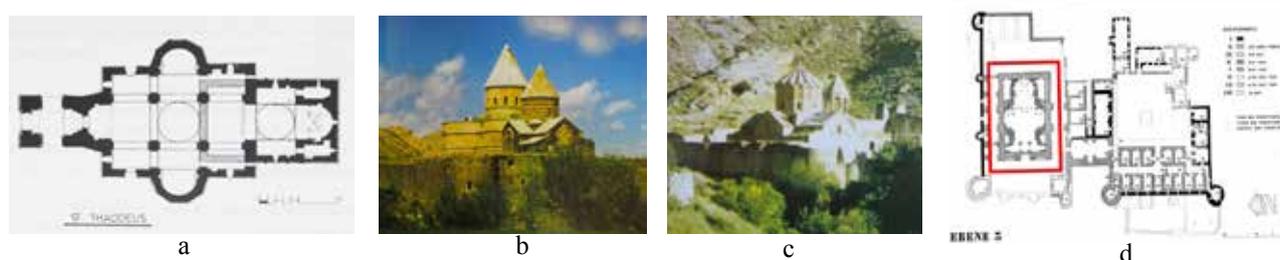


Fig. 2. Pictures and plans of the monasteries of St. Thaddeus and St. Stepannos.

- a) Plan of St. Thaddeus church (Qara Kelisa). Source: Arakelyan, 1996.
- b) St. Thaddeus church (Qara Kelisa) in Western Azarbayjan province. Source: Haghnazarian, n.d..
- c) St. Stephen Church in Eastern Azarbayjan. Source: Haghnazarian, n.d..
- d) Plan of St. Stepannos Nachavka church in the monastery. Source: Hofrichter, 1972 cited in Hovsepian, 2004.

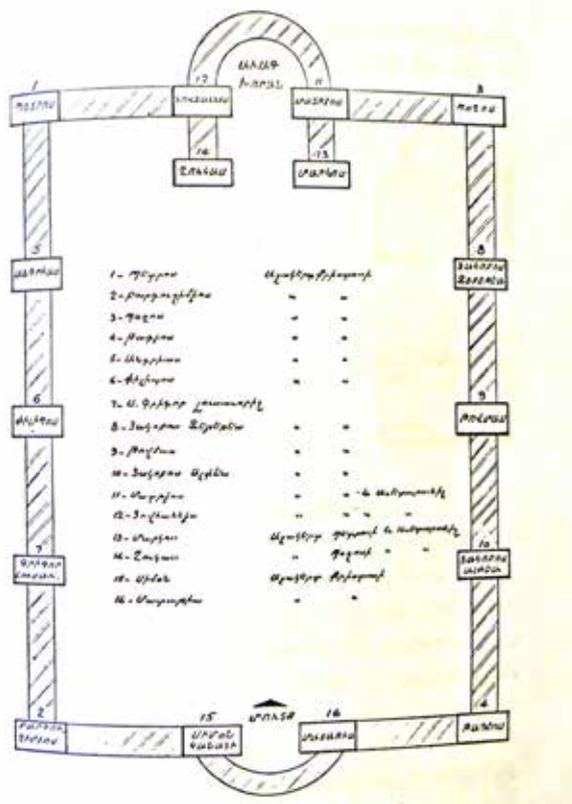


Fig. 3. Sacerd stons , and the name of 16 apostles. Source: Melkumyan, 2001, 34.

opposite the altar, although some other entries have been gradually added. The different compositions of the spaces create types of nave-shaped (St. George church), columnar (St. John the Baptist and St. Stephen churches) and domed (the Holy Mother of God and Bethlehem church).

The cruciform plan of the physical-spatial structure of the Armenian churches and its central span, which have been prominent with, light openings, dome, and drum, have been adapted to the Persian dome structure in some of the New Julfa churches.

• **The influence of external factors**

- **The will of Shah Abbas the Great on the plan of the churches**

The Shah’s intervention in plans to create the integrity and the splendor of the various parts of the capital was an effective factor in the layout of the New Julfa churches. Shah’s command on building a magnificent church implies the influence of his involvement and implementation in the design of the churches of New Julfa. Shah, in his own words, donated the church land

from the estate of the government to the Armenians; ordered the Christian priests and missionaries to arrange the layout of the church on board and endorsed it himself (Hunarfar, 1971). The purpose of Shah was in fact, construction of a church for all Christians and his persistence to locate it behind the “Zereshk” garden, situate it in the background of the royal gardens, could make the building coordinated with the pavilions of Chaharbagh.

- **Cultural and geographic features of the new land**

The location of the New Julfa neighborhood near Zayandeh-Rud and the availability of necessary infrastructure have contributed to the diversification and enrichment of public and urban spaces. The alignment of the ritual orientation with the lines of the New Julfa’s fabric grid, which originated from the characteristics of Chaharbagh Street and its gardens, formed an integral fabric in the primary core of New Julfa and placed the churches close to the main streets and passages.

As the similarity of the church structure grew closer to the Iranian buildings, the role of materials and its impact became more significant. Moreover, the role of materials is to create a link and harmony between the churches and their surrounding landscape within other buildings and natural elements. (Figs. 4 & 5).

- **The influence of prior architectural patterns**

The physical-spatial structure of the churches in New Julfa reminds the structure of a palace and a number of prominent religious buildings of the capital as it seems that they all have the same architects and the same employer. The similarity of the churches’ formal structures to the glorious buildings of Isfahan could be sought in Shah’s will and his intervention on one hand and involving his architects in New Julfa constructions (ibid.) on the other hand. Moreover, the types of buildings during this period and the influence of historic architecture had the potential to meet the rites of the church.

New Julfa churches

The sequence of the construction process of Armenian churches in New Julfa indicates that



Fig. 4. Solid walls and trees, the linking elements of landscape. Source: authors.

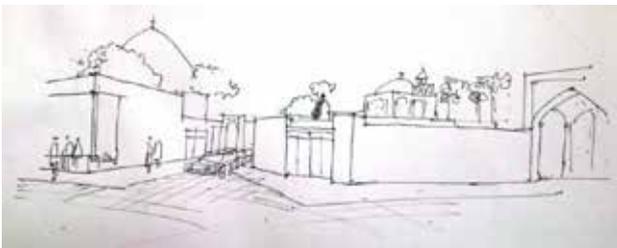


Fig.5. Square, solid walls and flooring, the Urban linking elements of landscape. Source: authors.

churches of one-nave type were established at first, then churches with a connected double-shell dome, next four-columnar space, and finally the type of churches with disconnected double-shell have been formed. There have been remaining six nave-shaped churches, four numbers of four-columnar churches, one church with a connected double-shell dome and two churches with a disconnected double-shell dome in New Julfa.

• **St. James Church (1608)**

The oldest church remained in New Julfa has a crossed one-nave type plan (Fig. 6).

A simple building with Persian round (cradle-shape) vaults and chartaq structure (Colombo), that one of the arms had destroyed in the Qajar period (Haghnazarian, 2006, 65) so the plan is surrounded in a rectangle (Table 1).

• **St. George Church (1612)**

Four years after St. James church construction, the St. George church was built. Both the plan and the construction technique show a significant evolution (Fig. 7).

The 3.40 m. extensive mass piers which are forming the high arches with a height of 10.60 m. including the architectural stucco ornamental karbandi implies the use of adobe in its construction. The grand hall with three chartaqs is reminding the Chihil Sutun¹², the glorious hall of Isfahan. Their similarity of structure and proportion reveals observing rules and construction ratio in Shah Abbas the Great period, and it seems to be a useful pattern for the St. George hall¹³ (Table 2).

• **St. Stephen Church (1614)**

The St. Stephen Church possessing a wide space of 17.20 m. height and 450 m² areas, is one of the vast churches in New Julfa. The St. Stephen Church can be considered as the result of the morphological changes in the structure of the St. George's one-nave Church to create large, yet low-cost spaces (Fig. 8). The St. John the Baptist Church and two other churches also

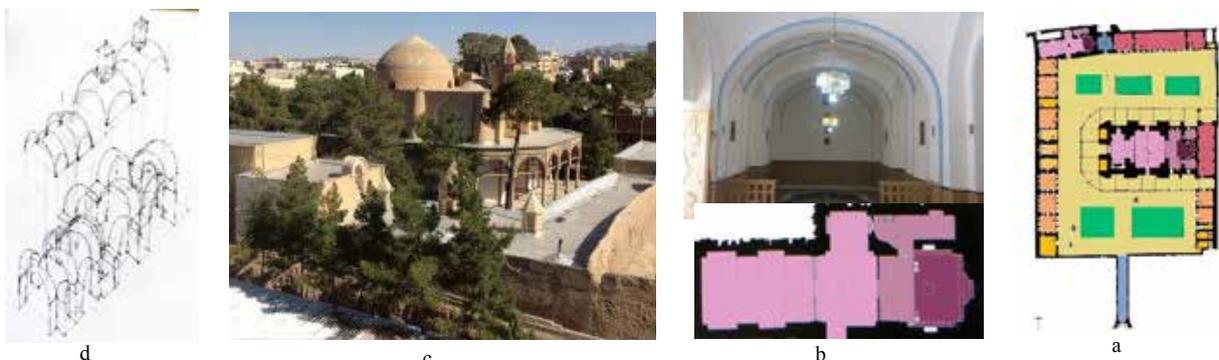


Fig. 6. The location, plan, and the vaults composition of St. James Church. Source: authors archive; Haghnazarian, 2006.

a) The location of St. James church at the northwest of The church area of The Holy Mother of God (in the middle).

B) St. James church. top: Persian round vaults. bottom: Crossing type plan.

c) A view of St. James Church and The Church of The Holy Mother of God.

d) The composition of the vaults' structure of St. James church.

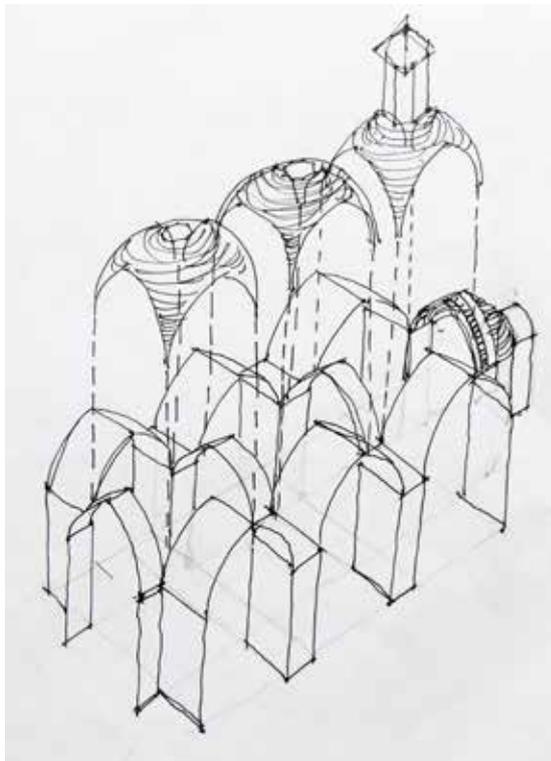


Fig.7. Structural system of St. George church. Source: authors.

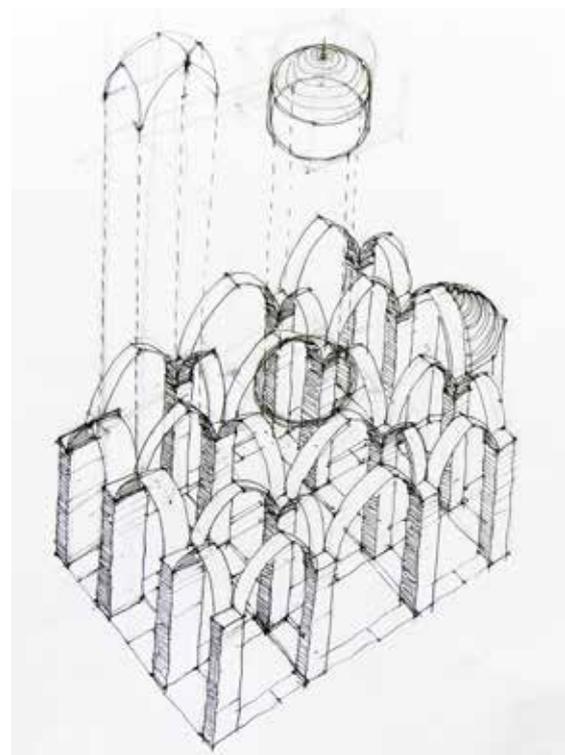


Fig.8. the structure of dome and vaultsof St. Stephen Church. Source: authors.

Table 1. The St. James church’s form characteristics. Source: Carswell, 1968.

	The height of chartaq	Main round arch height	Persian round (cradle-shape) vault height
Height (meter)	6.60	5.40	6.60
Width of the span of the hall (meter)	Transverse arch span 4.20	Longitudinal arch span 4	Width of the hall at the current crossing space 6.40
Length of the space (meter)	Length of the hall including altar 18	Chartaq bay 4.10	The altar and the priest’s sermon and choir space - (overlapped with next bay) 6 - (0.20)

Table 2. The similarity of construction ratio in the structure of the St. George church, and the Chihil Sutun Palace. Source: authors

	Chartaq height (meter)	Main pointed arch height/rise of the arch from impost (meter)	Longitudinal arch span (meter)	Transverse arch span (meter)	The length of sall(through the 3 arch spans)	The submultiple of vault to main groin arch (hollow of dome or chartaq)
The hall of the St. George church	10.60	8.30 / 2.3	8.40	5.30	19.60	1.277
Hall (talar) Chihil Sutun	14	12.33 / 2.6	11.50	8	28	1.135
The comparison of elements ratio of the St. George church and Chihil Sutun Palace	1.32	1.485 / 1.13	1.37	1.50	1.428	

were built as the same type sponsored by popular aid (Haghnazarian, 2006) (Fig. 9). This experience reduces the length of the church while increasing its width also accelerated the building process, and reduce the expenses.

• The Church of the Holy Mother of God (1613)

Two years after the construction of the St. George Church, Khodja Avetik built the Church of the Holy Mother of God. The first Church consisting of a connected double-shell dome is comparable to Sheikh Lutfollah and Tabriz Kabud Mosques due to the spatial characteristic including veranda, porch and standing on a platform called Soffeh¹⁴ (Fig. 10). The importance of the formal and spatial characteristic similarities, is related to a theory considering the influence of the pattern of the Kabud Mosque in Jahan-Shah Kara-Koyunlu period on the Sheikh lutfollah and Ali mosques (Hillenbrand, 2001, 104), while there is no trace of mentioning of the Holy Mother of the God church. The large width of the dome hall, the galleries overlooking the dome hall Barvar¹⁵ (Fig. 11) also the

porch alongside the altar (possessing narrow Iranian vaults), is bearing resemblance to the spatial structure and the transferred technological system. The low-rise height of entrance vaults has provided forming galleries on top.

• The Bethlehem¹⁶ Church

Following the Holy Mother of God church, the Bethlehem Church was built by Khodja Petrus. The church presents the same spatial sequence in a wider space. The structure of the galleries is the same as the Holy Mother of God church. The signs of additional elements in the Qajar period at the galleries and the veranda toward the court is evident. A part of the vestibule's fresco is destroyed in order to access the gallery's staircase. The construction of the Bethlehem Church is an experience little after the Abbasi Jame' Mosque. The physical proportion of their dome structure is shown in (Table 3). The Bethlehem Church's dome is a disconnected double-shell type and the highest among the New Julfa churches (Fig. 12). The dome plan is tending to a rectangle in the width

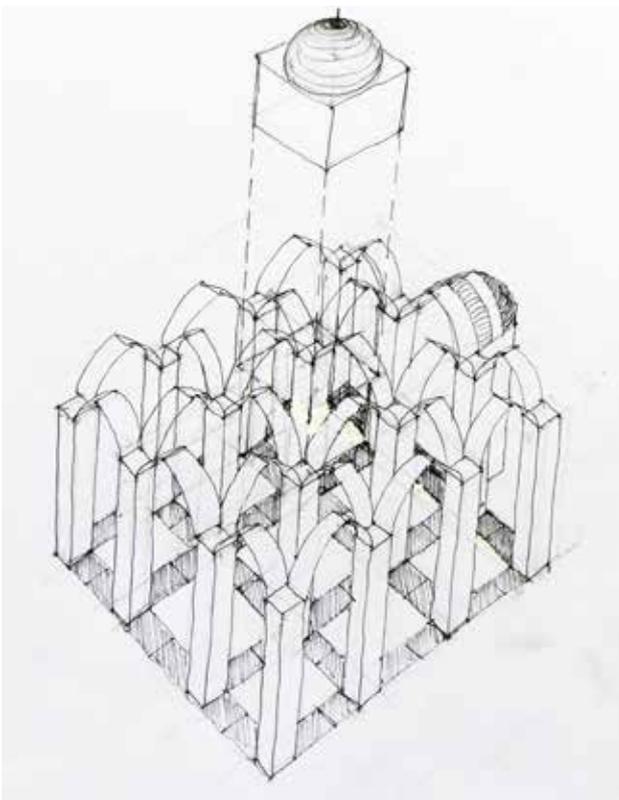


Fig.9. The structure of dome and vaults of St. John the Baptist Church. Source: authors.

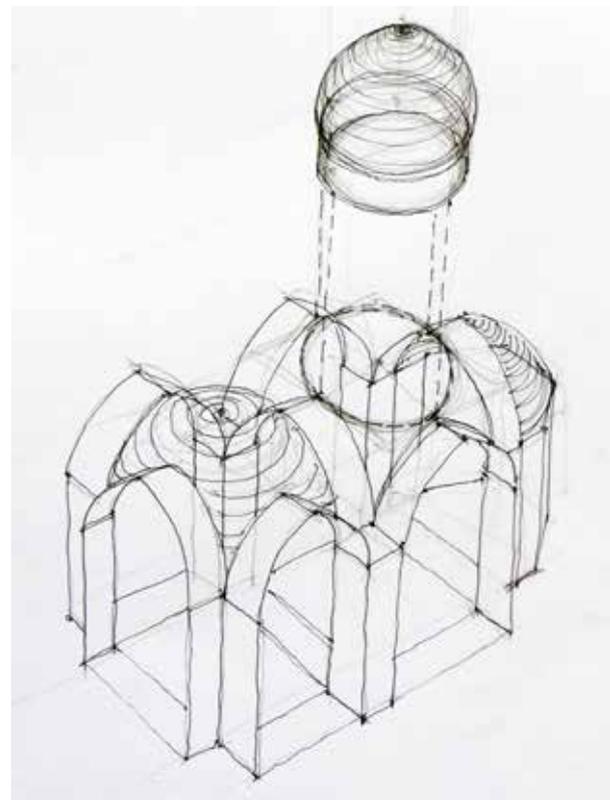


Fig.10. Structural system in the Church of the Holy Mother of God. Source, authors.



Fig. 11. Entrance elevation and upper gallery (veranda) - the Church of the Holy Mother of God. Source, authors archive.

which is effecting on the ornamental karbandi and the openings around the dome drum. The difference of its interior space with the Holy Mother of God church is the elimination of the vaults in a row adjacent to the altar for the replacement with a narrower vault which is making the spaces of the hall and the altar united. Also increasing the width of the dome bay make the length lesser (Fig. 13).

• **The St. Joseph Church (1665)**

The St. Joseph Church in the All Savior’s Vank¹⁷ is the last religious building that is holding a high disconnected double-shell dome as the Bethlehem church. Since the process of getting shorter into two bays (the chartaq, and the dome) has been achieved in this glorious church, the church has the least length amongst the churches (Figs. 14 & 15).

Physical elements characteristic and structural system of The Churches and the Naghsh-e Jahan Mosques

The similarities of physical elements proportion and structural system of the churches and the Naghsh-e Jahan grand Mosques illustrate converging religious architectural of Isfahan and New Julfa.

The results of the table’s rows are as below:

1. The heights of the exterior’s domes are between 21-25 meters;
2. The height of the inner dome of all churches is 19 meters;

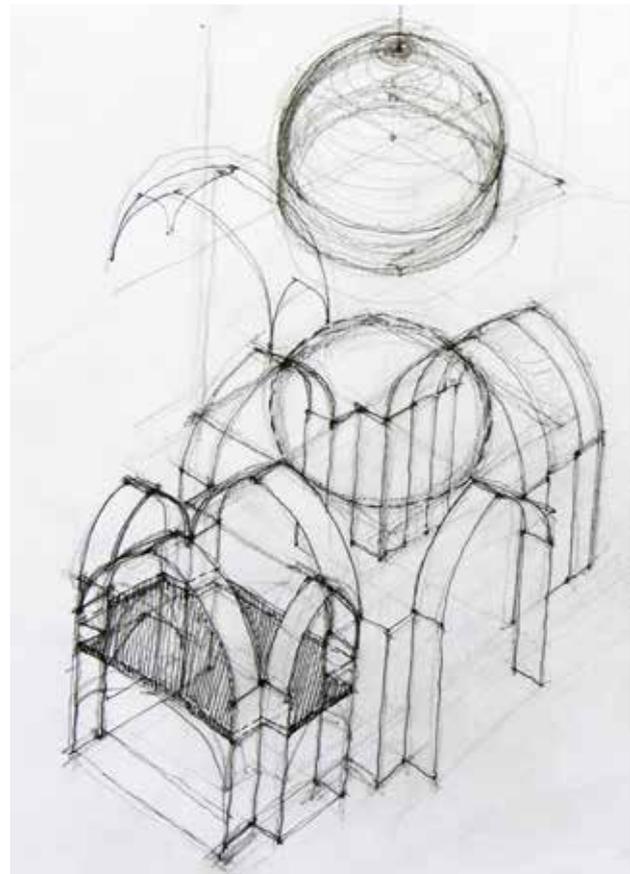


Fig. 12. The structure of the dome, chartaq, and upper gallery of the St. Bethlehem Church. Source, authors.

3. The arch vault’s height of three churches is close to the height of the Sheikh Lutfollah mosque;
4. The ratios of the height of the outer domes to the inner domes illustrate the similarity of the proportional characteristics of the structure of the domes amongst the Bethlehem church, All Savior’s cathedral, and the Abbasi mosque. Also, the convergence of the proportion ratio of the structures of the Holy Mother of God church and the Sheikh Lutfollah mosque dome is admitted;
5. In the three buildings of the Holy Mother of God church, Bethlehem church, and Sheikh Lutfollah mosque, the height of the two-story porch (galleries), functioning as a dome’s support, is approximately 6 meters;
6. The ratio of the height of the inner dome to the arch’s height in two structures of the Bethlehem church and All Savior’s cathedral is almost the same, so are the Holy Mother of God church and the Abbasi mosque;

7. The ratio of the arch's height to its span indicates that the volume below the transferring area (from the rectangular plan to the circular) in the Bethlehem church is a cube, in All Savior's cathedral is slightly higher than a cube and in the Holy Mother of God

church is 1.5 cube. The ratio considered close in the Bethlehem church, All Savior's cathedral, and the Abbasi mosque;

8. The ratio of the outer dome volume of the Bethlehem church and of the Abbasi mosque is almost close. The

Table 3. The proportion comparison of spatial and structural elements of the New Julfa Churches and Naqsh-e Jahan Mosques of Shah Abbas the Great. Source: authors.

No.	Height	Bethlehem church	All Savior's cathedral	The church of the Holy Mother of God	Sheikh Lutfollah mosque	Abbasi mosque
1.	The highest height of the building	24.75	24	20.60	31	51
2	The height of the chartaq/ inner dome	19	18.90	19	26.70	34
3	The height of the arch's vault of the dome	11	11	13	12	21.89
4	The ratio of the height of the outer dome to the inner	$1.30=24.75/19$	$1.27=24/18.90$	$1.08=20.60/19$	$1.16=31/26.70$	$1.5=51/34$
6	The height of two-story porch (barvar) supporting the dome (ground floor and upper gallery) and The height of the entrance volume	Ground floor's internal height:6.40 Upper gallery's internal height: 4.60 The height of the entrance volume: 11.70	- - 13.6	Ground floor's internal height:5.70 Upper gallery's internal height:7 The height of the entrance volume: 15.60	Ground floor's internal height: 6.0 11.50	- -
7	The ratio of the height of the vault/ inner dome to the arch's height	$19/10.80=$ 1.75	$18.90/11=$ 1.72	$19/13=$ 1.46	$26.70/12=$ 2.22	$34/21.89=$ 1.55
7	The ratio of the arch's height to its span	$11/11=$ 1	$11/8.6=$ 1.28	$13/8.20=$ 1.58	$12/18.5=$ 0.65	$0.89=21.89/24.5$
8	The ratio of the height of the outer dome to the width of its span (the erectness of structure and external volume)	$24.75/11=$ 2.25	$24/7.20=$ 3.33	$20.60/8.20=$ 2.51	$31/18.20=$ 1.70	$51/24.5=$ 2.08
9	The ratio of the height of the inner dome to the larger width of the dome span	$19/10.7=$ 1.78	$18.60/7.20=$ 2.58	$19/8.20=$ 2.31	$26.70/18.20=$ 1.47	$34/24.5=$ 1.39
10	The ratio of the height of the inner dome to the larger width of the dome span	$19/12=$ 1.58	$18.90/11.30=$ 1.67	$19/9.50=2$	$26.70/18.50=$ 1.44	$34/24.5=$ 1.39



Fig. 13. Associated spaces of the Altar and main hall of the St. Bethlehem Church . Source, authors archive.

All Savior's cathedral owning the highest volume ratio has 3cubes of height. The ratio is equal to 2.5 cubes in the structure of the Holy Mother of God church; 9. The ratio of the erectness of the internal space of the Bethlehem church, which is about 1.5 cubes, could be considered close to the Abbasi mosque's ratio. The All Savior's cathedral and the Holy Mother of God church have elevated to 2.5 cubes; 10. The internal volumes of the Bethlehem church, the Abbasi mosque, and the Sheikh Lutfullah mosque are elevated to almost 1.5 cubes. The Holy Mother of God is comprising 2 cubes elevation and it seems there was an intention in church's erectness.

Research Findings

The important role of structures, vaults and Iranian ornaments and pendentives in the churches' form in New Julfa is obvious. Their volumes of light opening (Kolahfarangi) are the same as the capital's buildings. The piers and arch spans have been evolved to four-column hall producing wider arch span and providing the hall of the church with a vaster space. The evolution process of architectural elements and space of the New Julfa Churches is originated in the St. George Church. The central chartaq structure has had the potential to evolve into a dome-hall¹⁸ structure. The Holy Mother of God church (1612) and the Bethlehem church (1627) represent the approaching the composition and the proportion of Isfahan architectural components and the idea of approaching Iranian architecture style

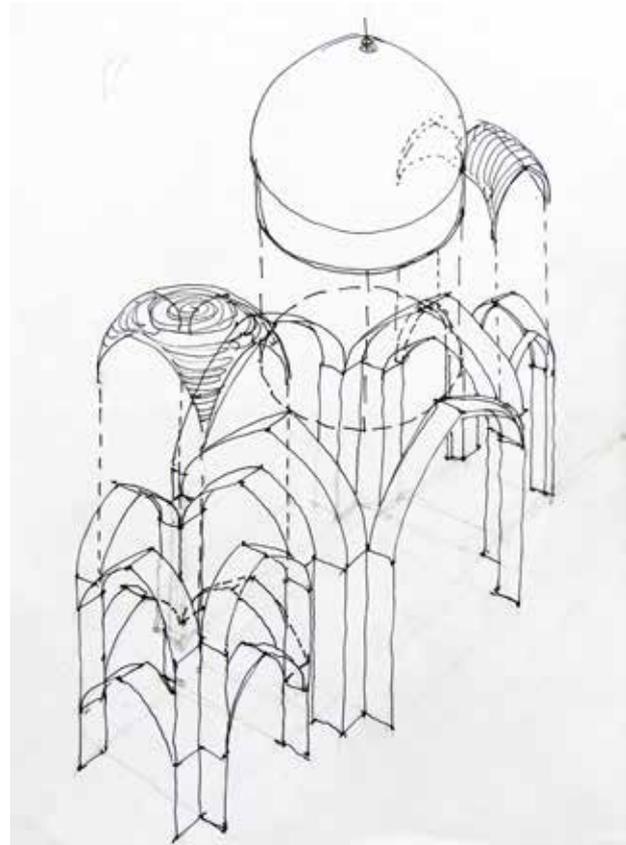


Fig. 14. The structure of the dome and chartaq, All Savior's cathedral. Source: authors.

in the New Julfa churches.

The Bethlehem church obtained a distinctive landscape by a high double-shell dome upon the drum. By decreasing the length of the church and increasing its width, the internal form was refined. Building the galleries upon the vestibule of the church (barvar), dominating the dome hall, diversified the interior space as it is seen in the Holy Mother of God church as well as the New Julfa houses, also, lead to the reducing of the piers' voluminosity of the church. Developing the All Savior's cathedral in 1655 (Ter Ovanessian, 2010)¹⁹, the overlap of the altar and the dome span, caused the integrity of the space and highlighting the altar from the end of the hall, also, more decreasing of the length of the church.

The findings indicate that the churches have had a formal development process from simplicity to glory. The glorious churches were built by Armenian tradesmen meeting the known patterns of the capital buildings of the same period in order to regard the harmony.



Fig. 15. Lessened number of chartaq in the latest All Savior's cathedral- with a main two shells dome and only one chartaq. Source: Haghazarian, 2006.

The multi-span nave churches tended to more vast internal space; the length and the number of the spans decreased while the width increased. In general, the evolution of the churches' morphology in the New Julfa is explicable in two parallel processes: First, the synchronization of structural evolution during the process of being glorious domed churches and second, the lessening of the length and the number of spans of the churches from the entrance to the altar.

Discussion

Through the mentioned sources, it is found that Armenia turned to the domed church construction after the primary nave shaped churches, however, it did not look forward to grand domes building as the Sassanids or Byzantine. Hence the Armenian churches had not domes alike the Parthenon or huge Sassanian domes. In return, the structure of the domes of New Julfa churches was instituted to be noticeable and emerging more glory of the Safavid capital.

The physical-spatial structure difference of the oldest existing church in comparison with the other churches in New Julfa vividly indicates the architectural techniques of the new context. The crossing form of the St. James Church plan and its round arches and vaults is unique. The general agreement of researches on the convergence of church architecture to the Iranian style, reveals the first sign in the physical-spatial structure of the St. George church composing of the high pointed arches and finally ends up with the similarity of the dome structure's forms of the

Bethlehem Church and the Abbasi Mosque.

On one hand, the viewpoint of Zander (2007), Reuther (2008) and Godard, Godard & Siroux (1988) on the intervention and the optimization of the massive piers through the Iranian architectural history from Sassanid to Safavid are adaptable with lightened piers in the New Julfa churches. On the other hand, "the Iranian fire temple's influence on the western Christian churches researched by K. Erdmann" (Zander, 2007, 26) and the early nave church being influenced by Mithras temples (Javadi, 2014) could be considered as the continuity of influencing the Iranian architectural ideas on the New Julfa churches. Moreover, Pope (n.d., 1201) introduced the churches of New Julfa as an adaptation of "European ideas to Persian forms" consisting of a "dome supported on four arches" originated from Iranian sources of the "fire temple plan".

In agreement with Avdoyan (2000), Hollowing out the massive piers of two sides of the church hall and extracting two rows of bays could create a continuous space while presenting a columned hall in accordance with Iranian hypostyle hall and emphasize convergence of the Armenian Church's architecture of New Julfa to the new context's architecture. Muratori's standpoint of the reflection of people's lives in "type", conforms to the evolution of the morphology of the Armenian churches in New Julfa. Durand's method of debates on building elements, elements proportion, and their relations is adaptable to the method of type recognition in this research.

Conclusion

Although the nave-shape churches shifted to domed structure in Armenia, because of the simplicity of the construction, it lacked the space of a dome hall alike the Parthenon or the huge Sassanid dome halls. In New Julfa churches, however, construction of huge domes was in line with the splendor of the Safavid capital and the social, economic and political credit of New Julfa.

The enclosed area and the natural elements of New Julfa churches are two important elements creating the

continuity and integrity of the urban landscape. The simplicity and explicit of the Armenian Churches' main outer walls indicate compliance with the rules, the customs of church construction and their rites.

The oldest church of New Julfa (1608) possessing a crossed-shaped plan, surrounded in a rectangle has a different style and get influenced by a kind of Iranian arch architecture. The plan of the St. James church is formed in accordance with the previous patterns of Armenian homeland which represents the primary pattern of the church building in New Julfa. The St. George church (1612), with its high "chartaq"s and Iranian architecture form, is the first existing church in New Julfa which contributed to the formation and the evolution of other types of church patterns. The plan of the church is similar to the pattern of the three large ornamental chartaq using in the Chihil Sutun Palace in accordance with the information of Table 4. As a generative type, it provided the formation of the columnar hall and the domed hall, therefore made the church architecture converged to the architecture of the mosques of the Naqsh-e Jahan square.

The Church of the Holy Mother of God (1613) with a porch around, placing on a platform and a structure of connected double-shell dome has the mutual characteristics with the Sheikh Lutfollah Mosque. The Church of St. Stephen (1614) is the first and highest columnar hall, which has appeared in the process of hollowing out the massive piers and extracting rows inside. Thus the side rows support the central bays providing a higher height for the building.

The proportional data of the physical-spatial structures of the St. George Church, The Holy Mother of God Church, The Bethlehem church and All Savior's cathedral in comparison with three outstanding buildings of the Shah-Abbas period, demonstrates the similarity of the churches to Iranian buildings and the influence of their principles. The Bethlehem Church (1627) and All Savior's cathedral (1665) have the most similarities with the Abbasi Mosque (1616-1629).

The research shows that, despite the various views on the influence of Armenian churches in various

geographical areas, most of the New Julfa churches are formed within the framework of the styles influenced by the Safavid period. There is no sign of the cross-shape volume of the St. James church, except in the plan. All churches have been tied to the simple walls and rules related to the church's rites, however, the technology of the Iranian vaults has retained its dominance over their volume. In the physical- spatial structure of the Holy Mother of God Church, the evolution of the central bay creating a high dome is realized. The construction style of the disconnected double-shell domes and the domed hall is comparable to the structure of the Abbasi Mosque.

Endnotes

1. Building of the existing Armenian churches in New Julfa took sixty years since the probable construction of the St. James church until the All Savior's cathedral development (1665), (Haghnazarian, 2006).
2. The physical-spatial structure in this paper means the general composition of the form and the structure in architecture, since the change and evolution of the building structure, leads to the change and evolution of the composition and proportionality of the space.
3. The "generative" type is a type which provides appearing new types through the evolution of its physical-spatial structure.
4. Jean Nicholas Louis Durand
5. Etienne Louis Boullée
6. Giulio Carlo Argan
7. Saverio Muratori
8. Many scholars, including the brothers of Krier and Aldo Rossi, have contemplated the type and the typology in the field of architecture. The classification of buildings based on their common features has been commenced in Iran for about three decades (Memarian & Tabarsa, 2013).
9. Zvart'nots or Zuart 'noc'
10. Ptghni or pthni
11. Terry Allen (1983)
12. Like the hall of the Aqa Kamal House (1605), which is very similar to the Chihil sutun Hall of Isfahan, in which Karapetian paid attention to this similarity.
13. The hall of the church refers to the interior space of the church in front of the altar.
14. "Soffeh" or the platform is the continuation of the idea of an artificial hill in the Timurid pavilions (Pope, 2008, 1658).
15. "Barvar", in the words of Mohammad Karim Pirnia (1994), is a space on either side of a large span such as corridors alongside a columnar space, Ivan (veranda) or Shah-neshin, a nave or porch.
16. The name of this church is cited in various names in different sources: Betghehem (Hovspian, 2007), Beit-ullaham (Haghnazarian, 2006), Bethlehem (Hovian, 2003; Carswell, 1968). [All the churches' names are written based on Carswell list].
17. The Vank of the New Julfa, named as the All Savior's cathedral was founded by Armenians in 1606 in remembrance of a monastery of the Julfa in Nakhchivan called Surp Amenaparkich. There was a small church in the vank for fifty years, which was replaced for the present church (constructed since 1655 to 1664) dedicated to St. Joseph of Arimathea (Hovsepian, 2014; Ter Ovanessian, 2010) [Nowadays, the vank plays a world connecting role not as a monastery but as the Armenian Diocese of Isfahan and the south of Iran. The church is being visited every day by the public].

18. Choisy (2007, 81-82) believes that “a type of an initiative section was constructed since the ninth to the eleventh century in Armenia”, which is referred to as “a conical dome upon on a drum”. The structure used across Caucasia in the area under the Seljuk Turks rules, made of bricks. Dome of the New Julfa churches which are similar to the Persian domes of mosques considered as a different type.

19. The demolition of the old church and the construction of the St. Joseph church instead, in the Vank of New Julfa (Hovian, 2003; Haghazarian, 2006).

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