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Touching Human Life in an Architectural Way: Social Responsibility and Home

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Abstract

Touching to human's life and creating a difference was always one of the main priorities of architecture. Especially when it comes to 'home', the responsibility of architect becomes a current issue; not only as a designer but in a social context as well. Starting after the end of the 2nd WW, the theme 'home' was discussed under many economic conditions. Designs for low-income people and spaces under the leading drive of participatory designs invited the architects to remember their social responsibilities. The aim of this study is to address different perspectives of how architects see 'home' since 1945, and evaluate. This outlook takes its roots not from architectural movements but from terms 'being happy and belonging to' in challenging and hard times. For this reason, in the title it is named as 'home' and not house as stated in architectural circles. The examples are chosen from different geographies, years and conditions. The experiences during their life time, the evaluation of the architect's decisions and the relationship between home and individual on social responsibility are the main starting points of this article.

Anahtar Kelimeler:

Ev, katılımcı mimarlık, konut, mimar ve insan, sosyal sorumluluk

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İnsan Yaşamına Mimarca Dokunmak: Sosyal Sorumluluk ve 'Ev'

Lerzan ARAS*

Öz

İnsan yaşamına dokunmak ve bir farklılık yaratmak mimarlığın her zaman temel önceliklerinden biri olmuştur. Özellikle söz konusu 'ev' olunca mimarın sadece tasarımcı olarak değil, sosyal bağlamda da sorumluluğu gündeme gelmektedir. 2. Dünya savaşından bu yana 'ev' konusu çok farklı ekonomik şartlar altında tartışılmıştır. Düşük gelirliler için yapılan tasarımlar ve katılımcı mimarlığın öncülüğünde oluşturulan yaşam alanları, mimarları sosyal sorumluluklarını hatırlamaya davet etmiştir. Bu çalışmanın amacı 1945'ten bu yana mimarların 'ev'e bakışı konusunda farklı perspektifleri ele almak ve değerlendirmektir. Bu bakış temelini tasarım hareketlerinden değil insan yaşamının zorlandığı anlarda ortaya çıkan, 'mutlu ve ait olmak' kavramlarından almaktadır. Bu nedenle de başlıkta adı mimarca bir terminolojiden uzak olarak konut değil 'ev' şeklinde konmuştur. Örnekler farklı coğrafyalardan, farklı yıllardan ve farklı şartlardan seçilmiştir. Örneklerin kendi var oluş sürelerinde yaşananları ve mimarın karar ve sosyal sorumluluğu bağlamında ev ile birey arasında kurulan ilişkiyi tekrar gündeme getirmek bu çalışmanın temel çıkış noktasıdır.

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Giriş

Mimarlık yüzyıllardır farklı tanımlarla hayatımızda yer alırken, son dönemlerde mesleğin geleceği ve kullanıcı ile ilişkisi konusunun daha çok tartışılmaya başlandığı görülüyor. Dünyanın geldiği noktada doğal afetler, savaşlar, kirlenme, hızlı nüfus artışı ve benzeri sorunlar daha belirgin olmaya başladıkça, her disiplinin kendini çözüm üreten bir çerçeveye yerleştirme ihtiyacı mimarlık için de çok gerekli bir hal alıyor ve bu bağlamda mimarlık Dutton ve Mann'in ifadeleri ile gücün, kültürün ve sahnelemenin kesişiminde, kimliklerimizin ve farklılıklarımızın oluşumunda önemli bir yer tutuyor (Dutton & Mann, 1995).

Böylece, değerlendirilmesi gereken başka noktalar olduğu gerçeği de kendini iyice belli etmeye başlıyor: *Mimarlık insana yaşamına daha fazla dokunmalı...* Mimarlık pratiğinde mimarın sorumluluğu çoğunlukla mesleğe ve kullanıcının isteklerine olan saygı ve farkındalık olarak kendini gösterirken, gereksinimlerin çok yönlü hale gelmesi ve düzenlerin sıklıkla daha zor ekonomik şartlarda kurulması mimarı insanların yaşamlarında daha aktif bir rol oynamaya yöneltiyor. Bu aktif rol mimarinin pek çok düzleminde kendine yer bulabilmekle birlikte, hepimiz için ortak nokta olan barınma yani 'ev' konusu ön plana çıkıyor.

Bu bağlamda 'ev' ihtiyacının mevcut ekonomik şartlarda yeniden tanımlanması gerektiğinde ise aslında mimarlar hafızalarını yenilemek zorunda kalıyorlar; çünkü modern dönemin bitişinden bu yana mimarlığın, gitgide 'daha iyi ve güzelini nasıl yapabilirim?' sorusu ekseninde dönen bir kurgusu olduğu görülüyor. Mimarlık; var olma çabasının da bir sonucu olarak, gün geçtikçe farklılaşan ve karmaşıklaşan bir sistemde kendini temsil etmeye çalışıyor; ancak, her zaman hatırlanması gereken en temel gerçek insanların *'ev'* sahibi olabilmek için *'güzel ve daha farklı'* kavramlarının dışında özelliklere de gereksinim duydukları oluyor.

Bu gerçeğin farkına varılması mimarlar için ciddi bir sorunsalı da beraberinde getiriyor. Bunca zaman kendini toplumsal ve yapısal çevre yaratma bağlamında *'özel ve farklı'* bir pozisyona oturtan mimarın yeni bir bakış açısı oluşturması gerekiyor ve bu kolay aşılabilir bir eşik olmuyor. Bülent Tanju'nun vurguladığı gibi, "kuşkusuz mimarlık ortamının büyük bir kısmı, eşiği gördüğü an oradan eski güvenli pozisyonuna geri dönmek isteyecektir" (Tanju, 2003).

Bu eşik, modern hareketin son dönemlerinde 2. Dünya savaşının bitiminde Avrupa'da geçilmiştir. Yeniden yapılanma sadece savaşı sıcak yaşayan ülkelerde olmamıştır. Tüm dünya, yaşamı sürdürmenin olmazsa olmazı konut üzerine kendi ekonomik olanakları içinde çalışmıştır. Elbette bu çabaların bir kısmı gecekondular, yanlış kentleşmeler ve kırsal ile kentsel arasında yanlış çözülmeler olarak olumsuz sonuçlar da vermiştir; ancak, iyi örnekler çoktur. Özellikle ekonomik

olarak düşük gelire fazlaca sahip nüfusun yerleştiği ülkelerde bu eşikte belli mimarların çabaları ve devletin sağladığı olanaklar ile çok olumlu geçişler sağlanmıştır.

Mimar olarak üstünde en çok çalışılan konulardan biri konuttur; ancak, konu zor ekonomik şartlar altında tasarlamak noktasına geldiğinde, mimarın kendi duygusunu, sorumluluk anlayışı ile birleştirerek insanlara *'evim'* ya da *'yuvam'* diyebileceği bir tasarım sunması gerekir. Amaç artık mükemmel bir mimari örnek olmanın çok ötesinde, insanın yaşamına doğru dokunmaktır. Bu nedenle bu çalışmada mimarca bir terminoloji çerçevesinde kullanılan *'konut'* sözcüğü yerine *'ev'* sözcüğü tercih edilmiştir. Özellikle de ev kavramının psikolojik anlamını ve ait olma özelliğini ön plana çıkartmak hedeflenmiştir.

Çalışma bu bağlamda 2. Dünya savaşının ağır bilançosunun ardından ayakta kalmaya çalışan insanların yaşamına değen mimari örneklerle başlamıştır. Daha sonra günümüze kadar farklı şartlar, yıllar ve coğrafyalardan örnekler seçilmiş ve bu örneklerin günümüzdeki mevcut durumları değerlendirilmiştir.

2. Dünya Savaşından Günümüze 'Ev'e Dokunuşlar

Dünya 20. yüzyılda 2 büyük savaş gördü. Kayıplar ve yok olan yaşamlar ile birlikte evlerini kaybeden milyonlarca insan çok farklı düzenlere geçti. Savaşın acı ve hüznünün yanında geleceğe bakmak ve yaşama tutunmak için çoğu insanın elinde tek kalan umut ise minimum şartlarda da olsa kendini güvende hissedeceği evlere sahip olmaktı. Bu noktada hem devlet hem de mimarlar için yeni arayışlarla farklı çözümler üretme zamanı gelmişti. 2. Dünya savaşının hemen sonrasında 1946 yılında Almanya'da dönemin mimarlarından Otto Bartning mimari duruşlarını şöyle sergiliyordu: "Bombalar sadece lüks cephelerimizi ve mimari süslerimizi değil binalarımızın temellerini de yok etti. Hiç şüphesiz hepsini tekrar inşa edeceğiz, yeniden var edeceğiz; ama eski cepheleri ile değil; basit, ekonomik, amaca uygun ve işlevsel olacaklar" (Betts, 2003).

2. Dünya savaşı sonrası insanlara yeni konut üretme çabaları 20. yüzyılın en geniş kapsamlı sosyal sorumluluğu olmuştur. Bu, mimarlığın insan ile kurduğu en yakın ilişkilerden ve en zorlu sınavlardan biri olarak da görülebilir; çünkü 'ev' insan için özeldir. Kendini ifade ettiği, yaşamındaki tüm anıları biriktirdiği, kendini yansıttığı yer olarak aynı oranda özel bir ilgiyi hak eder. Elbette 2. Dünya savaşının sonunda evlerin ekonomik olanaksızlıklar içinde oluşturulmaya çalışılmasının değeri de buradan gelmektedir: Hiç bir şeyi kalmamış insanlara yeni anılar oluşturabilecekleri ve acılarını unutabilecekleri yaşam alanları yaratmak ve bunu zor'u başararak yapmak...

Bu dönemin en başarılı ev örneklerden biri İngiltere'de görülmüştür. İngiltere üretimi hızlı, maliyeti düşük prefabrikasyon evlerin insanlar için ilk anda ciddi bir cankurtaran olduğunu düşünerek hızla üretmeye başlamış; savaş bitiminden 10 yıl sonra ülkede yaklaşık 450.000 ev inşa edilmiş (Şekil 1) ve bunların merkezi planlı yerleşimleri ile komşuluk ilişkileri de sağlanmıştır (Turner, 2015). 2 yatak odalı bu müstakil konutlarda açık bir mutfak ve yine prefabrike şekilde oluşturulmuş bir banyo yer almıştır. Dönemin şartlarına göre oldukça iyi sayılabilecek bu evlerin kendilerine ait küçük bahçeleri ve sundurmaları da tasarlanmıştır. Günümüz şartlarına göre zayıf da olsa, içeride var olan tuvalet ve küçük mutfak insanların yaşam şartlarını belli oranda kolaylaştırmıştır. Kimlerin bu prefabrike evlerde yaşayacağı konusuna devlet karar vermiş, özel durumda olan ya da çocuklu ailelere öncelik tanınmıştır. Bu yapıların kısa süreli barınma ihtiyacına cevap vermek için yapıldığı bir gerçektir; ancak, 2011 yılına gelindiğinde hala ayakta kalan ve oturulan 187 tane ev mevcuttur (Prefabs, n.d). İngiliz hükümetinin evleri tahliye etme ve bir kaçı hariç hepsinin yıkılması konusuna onay vermesine kadar geçen süreçte insanlar burada kendilerine gerçek bir 'yuva' kurmuşlardır.

Şekil 1 1947 yılında Hopewell Road, Kingston'da inşa edilmiş bir savaş sonrası prefabrike evin iç mekânı (Prefabs, n.d.).

Savaş sonrası çok zarar görmüş Avrupa kentlerinden biri olan Berlin'in yeniden inşa edilmesi de kolay olmamıştır. İnsanlar kendi olanakları ile evler yapmıştır. 1944 yılında Berlin'in güneyinde Lichterfelde bölgesinde yapılan evler buna güzel bir örnektir. (Şekil 2) Çok basit bir planla yapılan bu evlerin sadece 2 küçük yaşama alanı ve bir deposu vardır. Islak hacimler evin içine dâhil edilmemiştir. 1954'e gelindiğinde Batı Berlin'in üçte birinin 21.000 ailenin yerleştiği, plansız ama insanların kendi kendilerine inşa ettiği evlerden oluştuğu görülmektedir (Florian, 2013). Her ne

kadar savaş bitiminde alternatifler zaten çok kısıtlı da olsa, bireysel çabalarla oluşan düzenlerin insanları güvende tuttuğu bir gerçektir.

Şekil 2 1955 yılında Berlin'de Märkisches Viertel bölgesinde yapılmış "yeşil gecekondular" (Florian, 2013).

Mimarlar savaş sonrası kentleri yeniden inşa ederken, evrensel olarak kabul edilebilecek ilkelerle hareket etmişlerdir. Bu hareketlerin içinde en dikkat çeken ve etkisini gösteren ise CIAM'dır. İsviçre'de 1928 yılında kurulan ve 1956 yılına kadar toplantılarını sürdüren CIAM; felsefesini *'mimarlığın çağdaş programını formüle etmek, modern mimarlığın genel fikirlerini savunmak, bu fikirleri teknik, ekonomik ve sosyal çevrelere duyurmak ve mimarlık problemlerinin çözümlerini görmek'* olarak ortaya koyan bir yapılanmadır (Mumford, 2000). Le Corbusier ise bu çerçeveye bağlı olarak mimarlığı "Mimarlık bir ahlaklılık meselesidir" şeklinde tanımlamaktadır (Le Corbusier, 1986). Bu idealizm onun tasarımlarına kusursuz geometriler olarak yansırken, konunun ekonomik ve sosyal yönü aynı oranda yer bulmamaktadır. Nitekim CIAM'da belirlenen 'oturma, çalışma, eğlenme ve ulaşım' fonksiyonları dönemin karmaşık kent yapısına kesin çözüm getiremediği gibi modern mimarlığın ölümü olarak adlandırılabilecek yapıların oluşumunu da engelleyememiş ve dönem içinde mimarın ev'e dokunuşunun ekonomik zorluklar ve yanlış hesaplanan gelecek öngörüleri ile başarısız olduğu örnekler de oluşmuştur. Bu örnekler içinde en çok konuşulan ise New Orleans'ta 1954 yılında inşa edilen ve 1972 yılında dinamitlenerek yıkılan Pruitt-Igoe konutlarıdır (Jencks, 1977). (Şekil 3) Minoru Yamasaki'nin tasarımının ekonomik nedenlerle çok değişerek uygulanmış olmasının yarattığı niteliksiz ortak mekânlar bu yapıyı kısa sürede ev olma özelliğinden uzaklaştırmıştır. 57 dönüm üzerine kurulu ve her biri 11 katlı 33 binanın (Comerio, 1981) yıkımının *'modern mimarlığın ölümü'* olarak adlandırılması konusu çok yazıya konu olurken, aslında çok başka derslerin de çıkarılması gerekmektedir. Mimar ideal prensiplerle ve uygun

şartlarla tasarım yapsa da, ekonomik gücün ve sosyal şartların hesaplarının da doğru olması gerekmektedir.

Şekil 3 Pruitt- Igoe'da bir 'ev' ve birlikte ders çalışan anne- çocuk (Pruitt- Igoe, 2016).

2. Dünya savaşının bitiminin ardından devletin yerel yönetimlere düşük gelirliler için finansal destek olma çabası, konut ihtiyacının savaştan dönen askerlerle birlikte çok artması ile başarıya ulaşamamıştır. 13.000 dar gelirlinin (Comerio, 1981) yeterli havalandırması ve doğal iklimlendirmesi olmayan, ortak alanlardan yoksun ve güvensiz alanlarda yaşamak durumunda olmasının en büyük nedeni de budur. Ne Le Corbusier'nin idealizmi, ne de CIAM'ın alternatifleri ekonomik gücün olmadığı noktada mimarı iyi bir çözüm noktasına getirememiştir.

Aslında farklı sosyal statüler ve farklı kültürlerden insanların aynı mekânları paylaşması ve tasarımda söz sahibi olamamaları da bu sonu hazırlayan etkilerdendir. İnsanların ekonomik güçlük içinde de olsa onları mutlu edecek, evini istediği gibi yapacak ortamlara ihtiyacı vardır. Bu konuda özellikle kullanıcıyı tasarım sürecine katmak ve ona arzu ettiği yaşam biçimini sunmak konusunda yeni görüşler oluşurken, 60'lı yılların sonu ve 70'li yıllar mimarlık disiplininde sınırların bulanıklaştığı yılları temsil eder. Modernizmin avangard ve elit düzeninden daha tüketim odaklı ve gündelik bir düzene geçiş gözlemlenirken, bir yandan Venturi'nin Las Vegas tanımlamaları doğrultusunda ışıltılı bir mimarlığın örnekleri de belirgin olmaya başlamaktadır. Sosyal sorumluluk konusuna daha çok eğilen tasarımcılar da aynı bağlamda gündeme gelmektedir. 70'li yıllar modern dönemin rasyonel bakışının değişmeye başladığı yılları temsil ederken, dünya ekonomik olarak da bu değişimi yaşamaktadır. Pruitt-Igoe'nun yıkılması mimarlığı bir anlamda daha gerçekçi ve daha gündelik yaşamın içinde olmaya davet etmektedir. Sonuçta 1973'de kendini iyice belli eden petrol krizi (Aras, 2013) ve dünyayı daha eşit bir hale getirme çabaları mimarları yeni bir

sorumluluk içine çekmektedir: İnsanların istediği yaşamı sürebilme özgürlüğünü kendi ekonomik çerçeveleri içinde düzenlemek fikri...

Hassan Fathy, aynı yıl basılan 'yoksullar için mimarlık' (architecture for the poor) adlı kitabının giriş bölümünde gençlik yıllarında ona sorulan bir soruyu dile getirir: Size bir milyon pound verilse ne yapardınız? Fathy'nin buna cevabı şöyledir: "İki olası cevabım vardı; bir yat alıp arkadaşlarımla Bach dinlemek, ya da fellahların benim istediğim gibi bir hayat sürmelerini sağlamak" (Fathy, 1973). Aslında batı kökenli bir eğitim alan Mısırlı mimarın, modernizmin Mısır'daki başarısızlığını gördükten sonra, modern mimarlığın kuralları yerine kerpiç malzemeli, tonozlu ve geleneksel yöntemlere dayalı gölgeleme ve havalandırma tekniklerine döndüğü bilinmektedir. Bunun sonucunda ise kendi ifadesi ile daha mutlu bir toplum oluşmuştur (Mallgrave & Goodman, 2011).

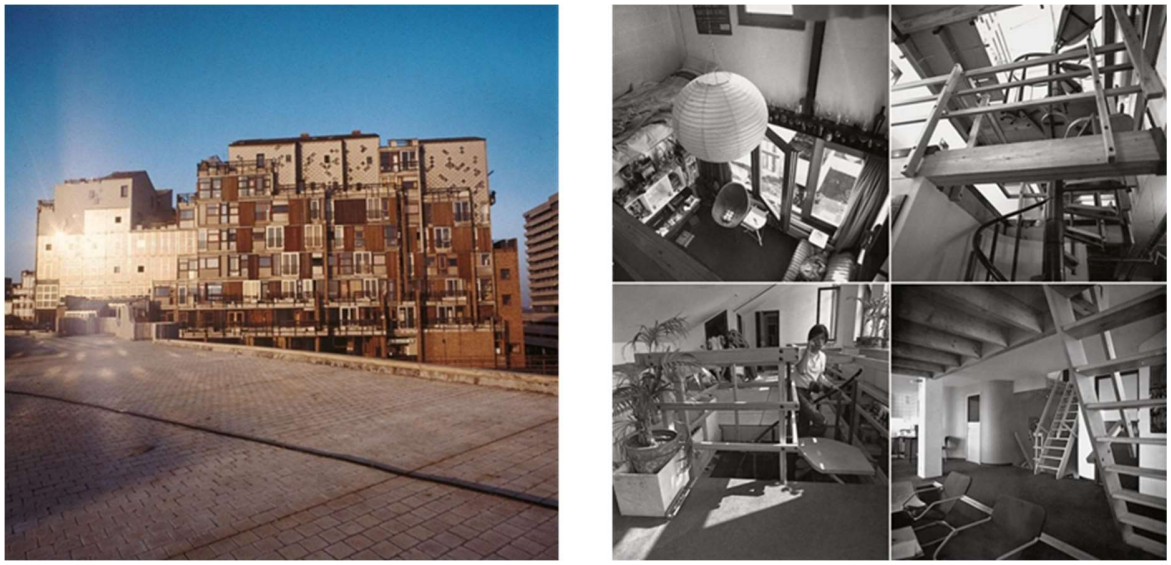
Mutlu olma ve ait olma kavramlarının bir ev için ne kadar önemli olduğu gerçeği ve bireylerin tasarım sürecine dâhil olma isteği mimarlık çevrelerinde kabul edilirken, örnekler artar. Yine 1973 yılında John Turner ve Robert Fichter'in editörlüğünü yaptıkları 'inşa etme özgürlüğü' (freedom to build) adlı kitap yayımlanır. İnsanların isteklerini ve gereksinimlerini gözönüne aldığınızda standart altı olan ile gerçekten içinde yaşamaya uygun olanın arasındaki farkın netleşmesi ve bireylerin kendi evlerini kendi bütçeleri dâhilinde inşa edebilir olması düşüncesi, bazı mimarları ve sosyal farkındalık konusunda çalışan kurumları Avrupa'nın pek çok yerinde düşünmeye sevk eder (Turner & Fichter, 1973). Turner'in 1957- 1965 yılları arasında Peru'da gecekondu bölgelerini islah etmek için yaptığı çalışmalarda ortaya koyduğu, 'kullanıcının evini kendi inşa etmesinin ötesinde finansal açıdan idare etmesinin' doğru olduğu görüşü günümüzde de geçerlililiği korumaktadır.

70'li yıllarda sosyal sorumluluk bağlamında tasarıma kullanıcıyı katma ve mimarın rolünü değerlendirme konuları fikri Belçikalı Mimar Lucien Kroll, Hollandalı mimar John Habraken ve Macar-Fransız mimar Yona Friedman önderliğinde tartışılmaktadır. John Habraken, 2011 yılında Teerds ve ve Havik'le yaptığı sohbette mimarın değişen rolünü şöyle ifade etmektedir:

> Ben, mimarı kat planı tasarlamak konusunda özgürleştirdim. Bir kent planlamacısı mimariyi değil, mimarinin içinde çalışacağı çerçeveyi kurgular. Bu da bize farklı seviyelerle çalışma fikrini verir. Bir tasarımcı olarak son noktayı görmeniz gerekmez; ama önemli olan noktaları harekete geçirmeniz beklenir. O yüzden artık mimarın kendini dışa vurumu ve orjinalliği konularından bağımsız olarak, herkesin ortak kullanımda serbestleşebildiği ve kendi kimliğini ortaya koyabildiği sistemlerden bahsetmeliyiz (Teerds et al, 2011).

Lucien Kroll da benzer bir çerçevede çalışmalarını sürdürür. 1961-1969 yılları arasında Rwanda'da konut ve kentsel tasarım komisyonlarında uzun süre görev alan mimar yerel yaşam ve buna bağlı yapım teknikleri ile yakından ilgilenir (Spatialagency, n.d). Bunu takiben 1972 yılında Brüksel'de

Louvain Üniversitesi'nde yaptığı Tıp Öğrencileri Yurdu projesi 'La MéMé' katılımcı mimarlığın en dikkat çeken örneklerinden biri olur. (Şekil 4, 5) Kroll'un deyimiyle 'çoğalan mimarlık' (incremental architecture), kullanıcıya kendi yaşam alanını kendisinin üretmesi şansını veren, yapının evrimine ve mekânların kişiselleştirilmesine izin veren bir strateji olarak bu projelerde karşımıza çıkar (Erten, 2015).



Şekil 4-5 La MéMé ve kullanıcı öğrenciler (Lucien Kroll, n.d.).

Aynı yıl içinde mimarın sosyal sorumluluğunun başka bir ifadesi olarak İngiltere'de doğu Londra'nın yoksul mahallelerinden biri olarak kabul edilen Poplar'da modern ve brutalist mimarinin bir örneği görülür. 1972 yılında Alison and Peter Smithson tarafından tasarlanan geç savaş sonrası sosyal konut yerleşkesi olan Robin Hood Gardens sosyal değerlere verilen önemi gösterme açısından güzel bir örnek olarak karşımıza çıkar. Kullanıcının ortak alan kullanımları ile birlikte komşuluk ilişkilerinin gelişmesi, bu tasarımın önemli kıstaslarından biridir. Yapının mimarları 'gökyüzündeki sokaklar' adını verdikleri her 3 katta bir yaratılan büyük gezinti balkonları ile (Robin Hood Gardens, n.d.). insanların sosyalleşerek ev yaşantısının hem içeride hem dışarıda oluşmasını hedefler. (Şekil 6, 7)

Şekil 6-7 Robin Hood Gardens iç mekânı ve 'gökyüzü sokakları' (Poplar, n.d.).

Ancak, bu girişim çok başarılı olmaz. Dar sokakların insanları cezbeden bir yönü oluşamayınca yıllar içinde insanların ev kavramına uymayan bir düzen baş gösterir. Robin Hood Gardens evlerinde oturanların çoğu ait olma ve güven duyma kavramlarının eksikliğini hisseder. Rattenbury'nin anlatımıyla, bu evler şehir planlamanın modernist ilkelerine öyle derinden bağlı tasarlanmıştır ki, insanların içinde yaşadıkları 'şeylerin' ev gibi çalışmasına ya da görünmesine olanak yoktur (Rattenbury, 2011).

Böylece yapının kaderi Pruitt-Igoe gibi olur ve Ağustos 2017'de yıkımına başlanır. Tasarımcıların mimar oğlu Simon Smithson'un Vandalizm olarak tanımladığı bu yıkımın oluşmaması için pek çok mimar çalışır. Bu çabalar boşa çıkmakla birlikte, yine de hatıralardan tamamen yok olmasına da razı gelemeyenler olur. Sonunda Victoria & Albert Müzesi (V&A), yapının 3 katlı 9 metre yükseklikte 5.5 metre genişliğinde bir kısmını korumaya aldığını ve Venedik Bienalinde sergileneceğini duyurur (Aras, 2018).

Günümüzde mimarlar teknolojinin tüm yeniliklerini takip etme şansına sahip. Ancak, konu insan yaşamı, onun ihtiyaçları ve beklentileri ve özellikle de yaşamımızın en önemli parçası olan ev olunca, tek başına teknolojinin fayda sağlamayacağı ortamlar oluşabiliyor. Yıllardır pek çok mimar insanın ev ile olan ilişkisini çözmeye çalışıyor. Le Corbusier'nin "ev, içinde yaşanılacak makinedir..." özdeyişi çok mekanik bir ifade gibi görünse de, aslında konunun can alıcı noktasını işaret eder: Ev, bizi barındırmanın ötesinde, bizim için kusursuz olmalı, mutlu etmeli, gündelik yaşamımızı kolaylaştırmalı ve hatıraları barındırabilmelidir. Kişi kendini o 'ev'e ait hissedebilmelidir. 1920'li yıllarda Le Corbusier tarafından Bordeaux yakınlarında Pessac'ta şeker fabrikası işçileri için tasarlanan konutların günümüzde de kullanılır olma sebebi budur: Kullanıcının yaşam alanlarını dönüştürme şansına sahip olmaları ve evlerinde kendilerini mutlu hissetmeleri... 1981 yılında bu evleri ziyaret eden gazeteci Huxtable bu konutları şöyle anlatır:

> Kullanıcıların yaptığı değişimler orijinal ana fikri bozmamış, tam tersi güçlendirmiş; kendi istediklerini yapmalarına olanak tanıdığı gibi, bu gereksinimlerin aslında neler olduğunu anlamalarını da sağlamış. Le Corbusier'nin 5 temel ilkesini elbette görebiliyorsunuz. Herkes onun 'konut içinde yaşanılacak bir makine'dir' deyişini hatırlar. Ancak, genelin unuttuğu onun bir sonraki cümlede söylediğidir:
>
> İnsanın bir kalbi vardır ve evinde mutlu yaşayabilmesini sağlamak bizim görevimizdir. (Huxtable, 1981)

Ev'e mimarca okunmak tabii ki sadece düşük gelirliler için üretmek demek değildir; ancak, günümüz dinamiklerinde yaşamın ağırlığını hafifletecek çözümler önem kazanmaktadır. Mimarın kendi prensipleri ve sosyal yaşam değerlendirmesi çerçevesinde kullanıcıyı tasarıma katması, mimar-kullanıcı ilişkisini daha özel kılmakta ve olumlu çözümleri arttırmaktadır.

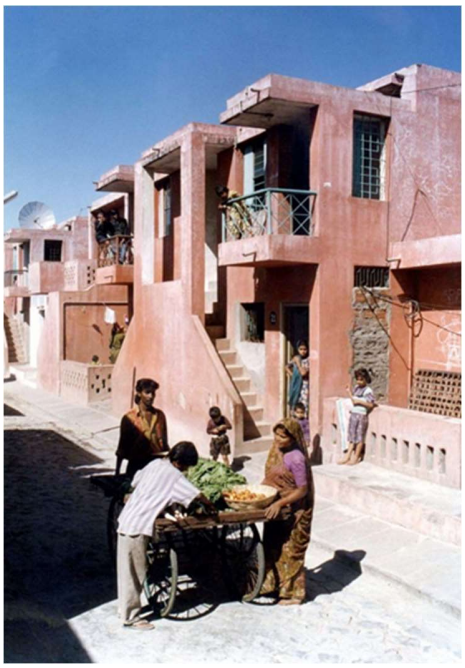
Yakın dönemde katılımcı mimarlık izlerini takip eden mimarlar içinde Şili'li mimar Alejandro Aravena sayılabilir. Mimarın düşük gelirliler için tasarladığı konutlar mimarın sorumluluğu konusunu yeniden tartışma ortamlarına yerleştirir. 2003 yılında Aravena ve mimarlık şirketi Elemental Şili Quinta Monroy bölgesinde 93 aile için bir konut çözümü üretmek üzere bölgenin yönetimi tarafından davet edilirler. 'Borçsuz dinamik sosyal konut' (Vivienda social dinámica sin deuda) olarak bilinen bu yeni ve yaratıcı uygulamayı yürürlüğe koyan yerel yönetim, her ailenin 7.500 dolar değerinde tek bir çek alarak bununla önce arazi ve çevre bedelini sonra bir konutun fiziksel yapısını karşılamasını hedefler (Ballesteros, 2010). Bu teşvik aslında yetersiz gibi dursa da, Aravena bir çözüm önerir: Kalitesiz ama tam bitmiş evler yerine yarım bitmiş ama kaliteli evler sunmak...

Bu; bir anlamda kullanıcı tarafından yapılması mümkün olmayan kısımların mimar tarafından çözülmesini, geri kalanının ise belli kurallar çerçevesinde kullanıcının kendi kontroluna verilmesini hedefleyen bir sistemdir. Bu sistem doğrultusunda tasarım yapan Aravena dar gelirli pek çok insanın kendisine ait bir eve kavuşmasını sağlar. (Şekil 8, 9) 2013 yılında Archidea dergisine verdiği röportajda Aravena mimari değerlerin değişmesinin gereğinden bahseder. Mimarlık yapısal çevrenin karmaşıklığını ve formların stratejik kullanımını sentezleyecek bir bütüne erişmelidir (Aravena, 2013).

Şekil 8-9 Villa Verde Evleri (Alejandro Aravena, 2016).

Öte yandan Aravena'nın bu cesur yaklaşımını farklı yorumlayanlar da olur. Boano ve Perucich, Aravena'nın çalışmalarının insanların iyi bir mimarlığa kavuşmasını sağlamadığını ve yıldız mimarlar için sosyalleşme sağlamak için bir yol olduğunu iddia ederler (Boana & Perucich, 2016). Bu iddialara rağmen Aravena'nın öncülük ettiği sosyal farkındalık ve insan yaşamına mimarca dokunmanın önemi mimarlık dünyasında özel bir yer edinir. Artık dünyanın daha zor bir yaşam alanı olduğu, savaşların çok insanı evsiz bıraktığı ve ekonomik sıkıntıların bir ev sahibi olmayı zorlaştırdığı gerçeği herkes tarafından kabul görmektedir. Bu çerçevede aynı zamanda kültür, sosyal ortamlar, gündelik yaşam ve insan ile olan ilişkiler de tekrar değerlendirilmelidir. Böylece 2016 yılında Pritzker ödülünü alan Aravena'nın tekrar gündeme taşıdığı sosyal sorumluluk yolu daha çok dikkat çekmeye başlar.

2 sene sonra 2018 yılında Pritzker ödülünü Hintli mimar Balkrishna Doshi alır. 70 küsur yılı içeren meslek hayatına Le Corbusier ile çalışmalarını da katan Doshi'nin yerel kültüre inancı ve insan yaşamının gereksinimi olan mekânsal kaliteye saygısı tüm tasarımlarında görülmektedir. Bu tasarımlar içinde ise Aranya konut projesi mimarın sosyal sorumluluk bilincini ortaya koyduğu en önemli eserlerinden biridir. 1989 yılında Indore'de tasarladığı bu toplu konut yerleşimi 86 hektarlık bir yerleşim üzerinde 6500 aileye ev sahipliği yapmaktadır (Aranya, n.d.). Doshi'nin kendi ifadesi ile "sadece ev değil, mutlu bir topluluğun yaşadığı evlerdir ve önemli olan da budur" (Balkrishna Doshi, n.d.). 1996 yılında Ağa Khan mimarlık ödülünü de kazanan bu tasarım, sürdürülebilir bir toplumun günümüz örneklerinden biri olmasının yanı sıra, mimarın insan yaşamına nasıl dokunabileceğinin güzel ifadelerinden biridir. (Şekil 10, 11).



Şekil 10 Aranya evleri (Asia, n.d.)

Şekil 11 Aranya evleri (Archnet, n.d.)

Günümüze daha yakın dönemlere göz atıldığında, 2012 yılında farklı bir coğrafyada Vietnamlı mimar Vo Trong Nghia'ın çelik çerçeve profili ile çok düşük maliyetli ve doğa dostu evler tasarladığı görülür. İlk prototip'in arkasından 2013'te de başka örnek evler yapılmaya başlanır. Mimarın amacı 2. Dünya savaşından beri en üst düzeye çıkan zorunlu göç ve doğal felaketler sonucu evini

kaybeden insanlar için her ortamda kullanılabilecek evler tasarlamaktır. (Şekil 12, 13) Bu evlerin ilk sergilenişi ise 2015 yılında Şikago Mimarlık Bienali'nde olur. Vietnam'ın özellikle tropik iklim koşullarında çok fazla yıpranan ve yıkılan evlerinin yerine konforlu ve dayanıklı bir alternatif çözüm olacağı öngörülen bu tasarımlara S- evler (S houses) adı verilir. Mimar ise amacını şu sözlerle açıklar: "Doğa ile insan arasında bir köprü kurmaya ihtiyacımız var ve sadece zengin olanlarla değil herkesle ilgilenmeliyiz" (Trong Nghia, n.d.).

Şekil 12-13 S- Evi tip 3 (Vo Trong-Nghia, n.d.).

Bu çalışma, her ne kadar sosyal farkındalık yaratmak için çok değerli bulunsa da, konu ile ilgili endişeler de vardır. Ulusal Singapur Üniversitesi Mimarlık bölümü öğretim üyelerinden Profesör Chang Jiat Hwee'ye göre; "Nghia çok iyi bir mimardır ve gerçekten firması ile birlikte aileler için bireysel anlamda çok konut tasarlamıştır. Ancak, toplu konut için ilk örnek (prototip) tasarlamak çok başka bir iddia olarak görülmelidir" (S-houses, n.d.).

Bu örnekler 2. Dünya savaşından günümüze çok farklı yılları ve farklı coğrafyaları içermektedir; ancak, kullanıcılarının ekonomik anlamda zorlanması ve yaşam alanları hakkında söz sahibi olma şansını elde etmek istemeleri onları ortak bir paydaya getirmektedir. Bu evler, içlerinde yaşayan insanların kendilerini mutlu ve güvende hissetme duyguları ile değerlendirildiğinde şu soruyu da sormak gerekebilir: Bu yapıların yıllar içinde kaderi ne olmuştur?

Pruitt-Igoe ve Robin Hood Gardens konutları yıkılarak tarihe karıştılar. Pruitt-Igoe, Jencks tarafından bir anlamda 'modern mimarlığın ölüm ikonu' olarak adlandırılarak mimarlık okullarının modern dönem tarih notlarında yerini aldı. Robin Hood Gardens ise bir parçası ile Victoria & Alberts müzesinin salonlarında yaşamaya devam ediyor.

İngiltere'de 2. Dünya savaşı sonrası yapılan evler kısa süreli barınma ihtiyacına cevap vermek içindi; ancak, buradan taşınmamayı tercih edenler oldu. Gazeteci Sonia Zhuravlyova 2013 yılında

bölgede az sayıda kalan evlerin kullanıcılarını ziyarete gittiğinde beklemediği bir manzara ile karşılaştı: İnsanlar bu evlerde mutluydu. Sohbetlerde ortaya çıkan, insanların savaş sonrasında kendilerini yapayalnız bulmalarına rağmen, bu evlerin cephelerinin birbirlerine bakmasının verdiği yakınlığın o yalnızlık duygusunu hiç hissettirmemiş olduğu gerçeğiydi. Aradan geçen yıllar içinde de hala kuş seslerini duyabilmeleri ve kentin gürültüsünden uzak kalabilmiş olabilmeleri ise onlar için ayrıca önem taşımaktaydı (Zhuravlyova, 2013).

Vietnam'da ise mimar 2017 yılında S-evleri'nin sayısını 38'e çıkartmıştır. Ba Vi bölgesinde yapılan bu evler klimasız, saz ve saman çatılı, dörder yataklı ve son derece sadedir. Bölgede inşa edilen evleri gezen bir Budist rahip, dört gözle kalmayı bekledikleri bu evler için şu yorumu yapar: "Bizim için yeterince iyi çünkü bizim basit bir hayatımız var!" (Prefabricated housing, 2017). Şu an bu proje beklendiği kadar hayata geçebilmiş değil; ama mimarın yerel malzeme ve az maliyet ile yaptığı projeler devam ediyor.

Aravena'nın sosyal sorumluluk ve ev kavramlarını tekrar mimarlığın ilgi alanına yerleştirmeyi başardığı ve uzun süre tartışmaların gündeminde kalan sosyal konut tasarımları ise daha talihli bir süreç geçirirler. 2016 yılının Mayıs ayında Michael Kimmelman New York Times'ın bir yazarı olarak bölgede insanları ziyaret ederek 27 yaşındaki Noemi Moran ve 37 yaşındaki Luis Flores'in evlerini ayrı ayrı gezer, onlarla sohbet eder. Moran, annesinden ayrılıp Villa Verde'ye ilk taşındığında yalnızlığından ağladığını ama bir sene içinde biriktirdikleri para ile evlerini tamamladıklarını söyleyerek gururla evini gösterir. Aynı şekilde Luis Flores de önce yarım bir eve sahip olma konusunda endişeli duyduklarını ama sonra bir sene içinde evlerini bitirdiklerini, sıcak sularının aktığını ve 3 çocuklarının da artık kendi odalarına sahip olmasının önemli olduğunu ifade eder. Yani, aile mutlu yaşamaya devam etmektedir (Aravena, 2016).

Balkrishna Doshi'nin 1989 yılında tasarladığı Aranya konutlarında da gündelik yaşam sosyalleşen bir topluluk ile devam etmektedir. Buradaki en büyük etken ise Doshi'nin sosyal yaşamı destekleyen tasarımı ile insanların kendi kendilerine yetebilecek bir mekanizma yaratabilmiş olmasıdır.

Belçika'da ise Lucien Kroll'un öğrencilerle birlikte inşa ettiği yurt binasının çok değişime uğradığı görülmektedir. Çoğunlukla tesisat iyileştirme ve güvenlik adına yapılan bu değişimler yapıyı orjinal halinden oldukça çıkarmıştır. 2016 yılında Reinier de Graaf Architectural Review dergisinde Lucien Kroll ve paylaşımcı mimarlık üzerine bir yazı hazırlar. De Graaf bu yazısında 30 sene sonra Lucien Kroll'u ziyaretini anlatır. 98 yaşındaki mimarın geçmiş günleri çok hatırlamamasına rağmen söylediği bir cümle hepimizin aklına ve yüreğine yerleşmesi gereken bir deyiştir: "Vitruvius'a göre mimarlık 3 temel üzerine kuruluydu: güzellik, kullanışlılık ve dayanıklılık... Ancak insanlığı unutmuştu ve bence bunun değişmesi gerekir" (User participation, n.d.). La MéMé bugün

değiştirilen iç mekânları ile anıt olarak tescillenmeyi beklemekte ve mimarın insan yaşamına dokunuşunun güzel bir örneği olarak tarihte yerini almaktadır.

Sonuç

"Başımın üstünde bir dam isterim, bana huzur sağlayacak bir mekân versin" Bu istek Tester ve Wingfield'in 2013 yılında evin anlamını araştırmak için yaptıkları sohbetlerin birinde dile getirilir (Tester & Wingfield, 2013). Bu, naif ve sade bir dilektir; ancak, akademik bir çerçeveden değerlendirildiğinde, evin insan için anlamının kültürel, fiziksel, sosyolojik ve psikolojik olmak üzere çok boyutlu olduğunu ifade etmektedir.

Judith Sixsmith 'ev' kelimesinin çok farklı disiplinlere ve araştırmacılara göre tarifini yaptığı makalesinde, eve anlam katabilecek 20 ölçüt ortaya koyar. Bu kategorilerin her biri ev için özel bir noktayı işaret ettiği için önemlidir. Hiç biri diğerinin önüne geçmez ve birlikte olmaları anlamın artmasını sağlar. Listenin en başında ise 'mutluluk, ait olma ve sorumluluk' kavramları yer alır (Sixsmith, 1986).

Aynı yıllar Sebba ve Churchman (1986), evin 'eşsizliği' üzerine yaptıkları çalışmalarını yayınlarlar. İsrail'de 185 kişi ile yaptıkları görüşme sonucunda vardıkları nokta ise şu olur: Ev; fonksiyonel bir yapılanma prensibi ön plana alınarak tasarlanmış bile olsa, insanlar kendi özgür iradeleri ile oluşan ve netliği olan mekânları kendi özel alanları olarak belirlemekte ve buralarda daha rahat yaşamaktadırlar. Sixsmith'in yaptığı çalışmada öne çıkardığı 'mutluluk, ait olma ve sorumluluk' ölçütlerine 'özgürlük, tanımlı olma ve ait olma' kavramları da eklenmektedir. Despres ise bu kavramlara ek olarak evin anlamı konusunda 4'lü bir değer dizisi oluşturur ve toplumsal süreçlerin analiz edilerek yapısal forma uyumlarının sağlanması gerektiğini vurgular (Despres, 1991). Somerville ise ev konusuna fenomonolojik ve sosyolojik yaklaşımları birleştirerek yaklaşır. Bu yaklaşımla birlikte evi mahremiyet, kimlik ve aşina olma kavramları ile özdeşleştirir (Somerville, 1997). 2012 yılında 'Journal of housing and the built environment'dergisi konut, ev ve yerleşim (house, home and dwelling) üzerine özel bir sayı çıkartır. Coolen ve Meesters'in yapılan tüm çalışmaları değerlendirdikleri makaleleri şu noktayı kesin vurgular: 'Ev' çok katmanlı, karmaşık ve çok yönlü bir kavramdır (Coolen & Meesters, 2012). Belirtilen farklı araştırmalardan çıkan sonuçlar ev konusunun teorik çerçevesinin çok çeşitlenebildiğini göstermektedir. Burada önemli olan hangi çerçeveden bakmanın kullanıcı için daha uygun olacağının doğru belirlenmesidir.

Bu makalede değerlendirilen örneklerin ortak paydası farklı coğrafyalarda olmalarına rağmen, kendi sosyal ortamlarını net yansıtabilmeleridir.

Tartışmanın ilk başında yer alan savaş sonrası İngiltere'de üretilmiş prefabrike evlerin ve Şili'de Aravena'nın tasarladığı sosyal konutların pek çok benzerliği vardır. En önemli ortak özellikleri ise kullanıcı için o an önemli olanı onlara sunabilmiş olmasıdır. Şili'de gelir düzeyi düşük kullanıcılar için bağımsız olmak ve sıcak suya sahip bir evde yaşamak onların şartları için önemliyken, İngiltere'de savaş sonrası yapılan evlerde yaşayanlar için, savaşın izlerini atlatabilecekleri, komşuluk ilişkileri güçlü ve bahçesi olan evler değerlidir. Bu yüzden bu konutları 'ev, yuva' olarak görmüş ve yaşamlarını devam ettirmeyi seçmişlerdir. Gündelik yaşamlarını kurmak bu evlerde mümkün olmuştur. Aslında ekonomik gücün az olmasının burada önemi azalmakta, kullanıcının isteklerinin doğru anlaşılması ise mutlu bir ev için kabul edilebilir bir kıstas oluşturmaktadır.

Birbirinden farklı coğrafyalarda olmalarına rağmen modern mimarlığın tüm izlerini barındıran Pruitt-Igoe ve Robin Hood Gardens'ın kullanıcılara uzun süreli mutlu evler sağlamadığı gerçeğinden hareket edilirse; ters giden, ya da yanlış hesaplanan ne olmuştur? Sorusu sorulabilir. Burada ortak görülebilen en temel eksik yaratılmak istenen komşuluk ilişkilerinin ve bunu sağlaması beklenen ortak alanların eksik olması ya da yanlış tasarlanmasıdır. Yamasaki'in Pruitt-Igoe için tasarladığı sosyal alanlar ekonomik sıkıntılardan dolayı inşa edilememiş; yerini koridorların birbirine bağladığı karanlık katlar almıştır. Robin Hood Gardens'ın gökyüzü sokakları ise çok dardır ve insanların sohbet edebilmesini sağlayamadığı gibi, güvensiz alanlar oluşmasına sebep olarak insanları tedirgin etmiştir.

İnsanlar mutlu olmadıkları, kendilerini güvende hissetmedikleri evlerde yaşamak istemezler; çünkü aidiyet duyguları oluşmaz. Gereksinim duydukları temel kıstaslardan biri budur. O nedenle dönemin bu 2 kült yapısı insan yaşamına dokunma konusunda eksik kalmış ve ancak tarihin sayfalarında ya da bir müzenin salonunda hatırlanır olmuşlardır. Oysa Doshi'nin Aranya konutları sosyal yaşamı destekleyen ve bireylerin kendi isteklerini özgürce gerçekleştirebilecekleri tasarımlar olarak oluşmuştur. Çok farklı bir kültürde Vietnam'da Nghia'nın tasarımları da tüm ekonomik hesapların yerli yerinde olmasına, hızlı üretilebilen ve dayanıklı evler olmalarına rağmen henüz 38 adet ile sınırlı kalmıştır. Bunun nedeni, bireylerin önem verdikleri bir kıstas olan yerellik kavramının prefabrikasyon ve çelik malzeme ile tam sağlanamamasıdır.

Bu örnekler arasında farklı bir yere oturan La MéMé ise aslında insanın istediğini özgürce uygulayabildiği bir örnek olarak Şili'deki Villa Verde konutları ile benzerlik göstermektedir. Öğrencilerin, kendi katılımları ile oluşan tasarımdan memnun kaldıkları bilinmektedir. Elbette yıllar içinde, eksik olan pek çok detayın yeniden gözden geçirilmesi gerekmiş ve yenilemeler yapılmıştır. Yapı, politik tartışmaların gündemine oturarak kullanıcının tasarıma katılma sürecinin artı ve eksileri tartışılmıştır. Şu an kaderinin ne olacağı bilinmemekle birlikte, bir dönem içinde yaşayan mutlu kesim hep hatırlanacaktır.

Mimarın sosyal sorumluluğunun nerede başlayıp nerede bittiği sorusunun cevabını vermek kolay değildir. Ancak, kısaca değerlendirilen bu örnekler ışığında şunları söylemek mümkündür: İnsanlar mimarlığın kurallarından önce kendi gündelik yaşamlarının doğru akışını görmek isterler. Temel ihtiyaçlarının giderilmesi, alışkanlıklarının devam edebilmesi, aidiyet ve güven duygularının gelişebilmesi bir konutu 'ev' yapmak için ekonomik güçten daha önemli bir sembolik güç olarak ortaya çıkabilir. Tüm bu temellerin ise sürekliliğinin sağlanması gerekir. Ama mimarlık, dinamik ve devamlı kendini yenilemeye çalışan bir disiplindir. Bunun da ötesinde güzel ve teknolojik olana olan bağımlılığı onu çoğu zaman bir ikileme götürmektedir. 'Güzel' olanı yapmak kadar 'gereken'i yapmak ve yine de kendi prensiplerinden ödün vermemek arasındaki çizgiyi nerede çizeceği konusunun cevabı hiç bir zaman net değildir. İnsan yaşamına onun için çok değerli olan 'ev' konusunda dokunmanın tek doğru ve kesin bir çözümü olamayacaktır. Ancak, belki de kabul edilebilecek olan gerçek, konu 'ev' olunca ve dış etkiler güçlü ve zorlayıcı şekilde ortaya çıkınca her zaman mimarın daha iddialı ama bir o kadar da dikkatli ve düşünceli olmaya devam etmesi gereğidir.

Kroll'un dediği 'insani' olmanın değeri ve gereği burada yatmaktadır…

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1988 yılında İ.T.Ü Mimarlık Fakültesi'nden mezun oldu. Tarihi çevre koruma üzerine yüksek lisans çalışmalarını tamamladıktan sonra, işletme yüksek lisans çalışmalarını ve mimarlıkta eleştiri üzerine doktorasını aynı anda yürüttü. Araştırma görevlisi olarak da çalıştığı İTÜ'deki akademik hayatını doktora bitimininde sonlandırdı ve farklı çalışma alanları ile farklı üniversitelerde deneyimler edindi. Şu an Lefke Avrupa Üniversitesi Mimarlık Fakültesi'nde öğretim üyesi olarak görev yapmakta; yaşam, ev, gündelik hayat, sosyoloji ve mimarlık, travma geçirmiş mekanlar, sosyal sorumluluk ve tüm bu kavramların insan ile ilişkisi üzerine çalışmalarına devam etmektedir.

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The Role of Participation in Identification and Sustainability of Heritage; the Windmill of Heybeliada[1]

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Abstract

Cultural heritage, when considered as a unique and perpetual social structure, humans are likely to be the main determinant of all constitutive elements, and therefore the most prominent factor of conservation practices. This point of view also makes it possible to envision a composite relationship between cultural heritage and locally-related communities where all parties generate, nourish and enhance one another. In this sense, 'creation' of the heritage, depends not only in the physical space specified by concrete conditions, but also in the resources and potentials of the people or communities associated with it. Accordingly, the possibility of inclusion, where communities play an active role in the conservation of cultural heritage, is becoming increasingly important within the quest for wholeness, perhaps even a common future agenda through these various interconnected elements. In the scope of the paper, a more participatory and inclusive heritage practices based on an interactive learning and exchange of knowledge is discussed in accordance with the experience gained from a heritage workshop conducted by the authors.

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Anahtar kelimeler:

Miras, atölyeler, katılım, topluluklar

Katılımın Mirasın Tanımlanması ve Sürdürülmesindeki Rolü: Heybeliada Eski Değirmeni[2]

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Öz

Kültürel miras, varolduğu dönem ve yere özgü, devamlılığı olan bir sosyal yapı olarak düşünüldüğünde; insan, bu yapıyı oluşturan bütün öğelerin temel belirleyeni ve koruma olgusunun en önemli dayanak noktasıdır. Bu bağlamda, miras 'yaratım' süreci, biçimi ve sürdürülebilirliği; yalnızca somut koşulların olanak tanıdığı fiziksel bir uzamla değil, aynı zamanda kendisiyle ilişkilenen kişi veya toplulukların da sahip olduğu kaynak ve potansiyellerle yakından ilişkilidir. Bu çok girdili ve/veya gelişime açık bir ilişkiler ağından anlamlı bir bütün, hatta belki bir ortak gelecek gündemi yaratım sorunsalı çerçevesinde; yerle ilişkili paydaşların kültürel mirasın korunması sürecinde daha etkin bir rol oynaması sayesinde şekillenebilecek bir dahiliyetin olanaklıları giderek daha çok önem kazanmaktadır. Makale kapsamında; yazarlar yürütücülüğünde gerçekleştirilen Heybeliada Tarihi Değirmeni miras atölyesinden edinilen deneyimler yordamıyla; interaktif bir öğrenme ve bilgi paylaşımı zemininde temellenen, daha katılımcı ve kapsayıcı bir miras olasılığı tartışmaya açılmaktadır.

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Introduction

"*A right to a heritage brings with it a duty to respect that of others*"
Faro Convention, Council of Europe

Culture must be understood in the broad constituent sense of "cultural traditions, beliefs, values, and fundamental convictions that constitute individual and collective identity" (Kangas and Sokka, 2015: 141). Therefore, cultural heritage can be considered as a unique social structure that continues to be created, decreated and recreated every day in terms of an individual and collective identity. Humankind, in this regard, is likely to be one of the main constitutive elements, and the most prominent factor of this collective and perpetual process. This collective attachment to a place that embodies meanings and values that are important to a community or communities are defined as, social value (Jones 2017, Ferreira and Duxbury, 2017) and this accumulation can create resource for the development of societies by fostering pluralistic scenarios and enhancing existing stochastic representations.

Culture as a sector embraces tangible and intangible heritage, cultural and creative industries and cultural infrastructures and is the fourth dimension of sustainable development (Hawkes, 2001; Soini and Birkeland 2014; Dessein et al., 2015; Asikainen et al,2017), as evidenced in terms of poverty alleviation, social inclusion and environmental sustainability (Hewison and Holden 2006; Holden 2006). In a similar way, the Faro Convention (Council of Europe 2005) stated that the value and potential of cultural heritage can be used as a resource for sustainable development and quality of life in accordance with developing knowledge to facilitate a peaceful social cohesion. Its central ideas including cultural diversity, shared responsibility and public participation bear a strong resemblance to recent documents including The Florence Declaration on Heritage and Landscape as Human Values (ICOMOS 2014) and Delhi Declaration on Heritage and Democracy (ICOMOS 2017).

This contemporary approach adopting new means of dialogue that allow related communities to take initiative for heritage as responsible agents. Public participation is in the core of this contemporary scene, while gaining broader understandings every passing day. Sani et al. (2015) identify participation as a capability development process and emphasize that this approach "challenges the notion of 'participation' as doing for or even with, but rather focuses on communities doing for themselves, with the help of a range of resources".

While empowering the very notion of living heritage along with its related communities, heritage itself must be considered as one of the most functional capacity building tools which contributes greatly to collective creation of meaning and semantic integrity. A cognitive process which can lead to exchange of notions in certain groups as well as the realization of the holistic potential may also nourish the sustainability of cultural heritage. In the scope of

this paper, the means of a more inclusive, nonhierarchical and multicentered approach to heritage as well as the possibility of its practical applications have been discussed.

Methods

How might the social value, be taken into account in the context of heritage management and conservation? Some have argued that to gain an understanding of values and to imply capacity building practices, it is necessary to carry out research with communities of interest using qualitative methods derived from sociology and anthropology (de la Torre and Mason 2002; Harrison 2011). These methods involve the use of various techniques, such as focus groups, qualitative interviews and participant observation. In short term, focused research that involve ethnographic practices, rapid qualitative research is also included. Rapid qualitative research techniques (Denzin and Lincoln 2000; Knoblauch 2005; Creswell 2009; Harrison 2011; Becker 2014 etc.) such as place-based oral history interviews, site walks with community members, counter-mapping and audio-visual recordings are increasingly popular and are often characterized by mixed methods and multidisciplinary teams. However, a key part of the process is that the attribution of expertise, whilst still important, is decentred and distributed, whereas professionals and community participants are being recognized for their different kinds of knowledge and skilled practice (Harrison 2011; Emerick 2014).

Heritage workshops that can be defined as a contemporary and innovative conservation approach that provide participants an opportunity to openly consider and discuss about the relationship they have established with cultural heritage. As Newing (2011) also states, in these workshops, all suggestions, ideas and references are noted down without any change or criticism in a powerful way to provide a prosperous knowledge through semi-systematic brainstorming which encourage all people to contribute. This encouragement may lead to emergence of new and profound connections, value sets and unprecedented potentials.

In this framework, a heritage workshop, *What is the Heritage of It? : The Windmill of Heybeliada*, was designed and conducted by the authors. The windmill, while being an important element in the natural and cultural landscape of Heybeliada, has reached its present day by losing its architectural identity to a great extent. Despite the fact that, the architectural survey and conservation projects were appropriately prepared by academic members of Mimar Sinan Fine Arts University and approved by the regarding Conservation Board primarily, they proved to be insufficient and non-effective in terms of the sustainability of heritage values. In this context, the main problem of the study wass whether the mill is defined as “heritage” or a "memory figure" by other related communities including its local inhabitants. Cultural values along with identifiability of this heritage in the urban memory were aimed to be discussed further and evaluated in detail through a workshop.
Being extended roughly over a month, the practices allowed more than 50 participants discuss about the windmill, its values, potentials and different conservation approaches. It aimed at

bringing together different aspects, understandings and values in order to bridge the gaps among different stakeholders. During the workshop, conservation specialists functioned as facilitators rather than sole decision-makers to foster a mutual learning experience while the references, observations and key findings were collectively examined throughout the process.

The Windmill of Heybeliada

The windmill located on the western coast of Heybeliada, extending towards the sea as a part and finishing mark of Ümit Tepesi (Papaz Mountain), as Tuğlacı (1995) also mentions, since the hills and coasts take the dominant wind are the most suitable for production. Known to be watchtower during the Byzantine period, it functioned as one of two windmills for nearly a century, by the monastery of Ayia Triada (Erdenen 1962). 18th century watercolor painting (Figure 1) of the coast and the windmill in addition to a map from the 19th century are the oldest available visual documents from this period. However, the presence of two different windmills in Heybeliada proves the production of a large amount of wheat, enough for at least two large monasteries, or even the whole village, as Türker (2003) states.

Figure 1 Water colour picture by Bauer, 1786-87. (Millas 2000)

It is possible that the mill was negatively affected by the era and it was also damaged by the 1894 earthquake. The whole area was expropriated during the Republican Period and owned by the Treasury as of 1941 and was used as a garden by Sadık Güzel Osman according to registry of deeds. The mill, on the other hand, was converted to a mansion and used as a backhouse and a mansion (Personal Interviews). Sönmez family, who worked and lived there, had even delivered one of their children inside the mill. With the decision of the Supreme Council of Antiquities and Monuments (Date: 14.4.1973, No: 7087), the mill was inscribed and registered as a cultural asset, namely “Religious and Formal Antiquities to be Protected”. Prior

to being an urban observation terrace, Değirmendere Area was taken for public use and the mill was left abandoned for a time period. Nowadays, the mill continues to exist merely as a landscape element, and is not used effectively (Figure 2).

Figure 2 Current state of the mill (Kıraç,B., Töre,T., 2014)

The mill as a witness of the monastery life of Heybeliada, its testimony to the history of production and the traces of the traditional flour production, are of great value. Rough cylindrical form on a rocky ground; the mill consists of a single space with a circular plan of approximately 640 cm in diameter. The 533cm high, roofless structure; exhibits its stone texture on completely non-plastered facade except for its arched doorway on the southeast side (Kıraç and Töre, 2015). Reinforced concrete slab in addition to a load-bearing column in the center were added in the interior. Probably due to this intervention in the 1980s, the traces of the authentic function on the masonry structure are only partially accessible. Today, a metal staircase that leads to the terrace is present and the mill lacks a roof.

Surrounding territory of the mill has continued to be used as a semi-private recreational area. The whole area can be described as an impressive landscape overlooking Burgazada and is still known as 'Değirmen Burnu' after the mill. It has a symbolic meaning for Heybeliada, with its physical qualities and geographical aspects along with its impression on the silhouette. However, issues of accessibility, the absence of a clear route from the pier, and the lack of historical information about the mill are conservation issues that the region faces today. This situation decreases the importance of a prominent urban element and destroys its cultural significance. The name, Değirmen Burnu remains as the mere reminiscent of a lost tradition and producing culture.

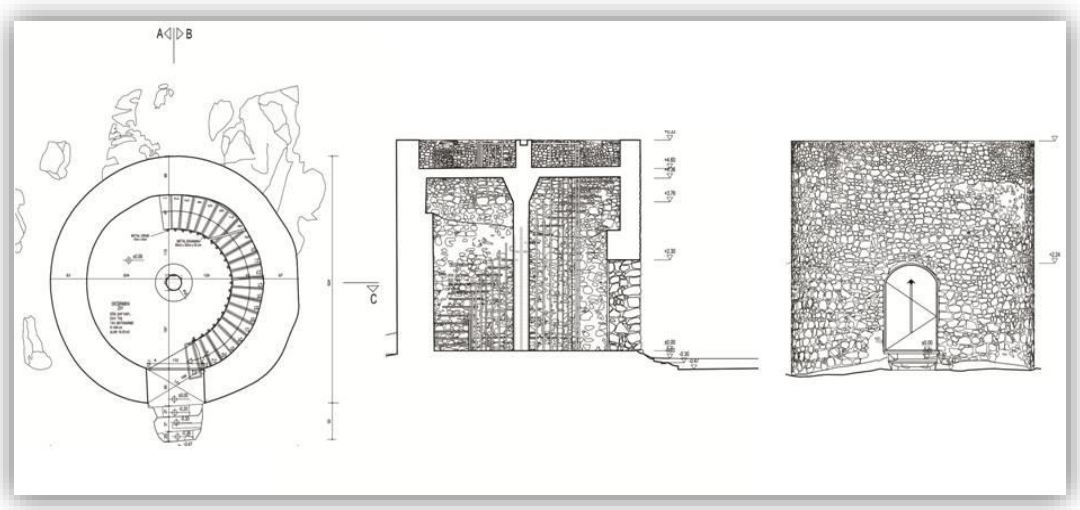

Figure 3 Architectural Survey of the windmill (MSFAU, 2014)

As of 2014, while the architectural survey, conservation projects[1], analyses and documentation were prepared and presented, the mill lost its architectural integrity and were severed from its context (Figure 3). Although, the conservation projects were approved by the Conservation Board, and the mill was decided to be revitalized and partly reconstructed in its authentic function, authors have felt the need of defining tangible and intangible heritage values that it encompasses. In this framework, the quest for placing this cultural heritage in urban memory, 'a mill which has not been used as a mill for almost 150 years', also reflects a genuine attempt for a 'better' and more inclusive conservation approach with regards to integrated sustainability.

What is the Heritage of It? : The Windmill of Heybeliada

The story that the heritage tells us, is as much important as the actual structure itself. That being one of the main ideas which has inspired the workshop, What is the Heritage of It?: The Windmill of Heybeliada, represents a hidden search for meaning. Thus, the whole process was designed as a value-oriented heritage practice which allows free exchange of ideas on what an heritage element may tell us and what we may understand from it.

Creating more networks while transferring the basic conservation principles directly and/or indirectly, searching for a deeper understanding of how heritage is perceived among various groups and seeking a broader perspective for the future of the mill were among the main priorities. In this way, transforming the conservation process into a participatory,

[1] Architectural Survey, Restitution and Restoration Projects of Heybeliada Old Mill with the protocol between MSFAU and Adalar Municipality, 2014 (Demet BİNAN, Burcu BÜKEN CANTİMUR, B. Selcen COŞKUN, Tigin TÖRE, Dilara Gökçen Akçay).

collaborative and inclusive heritage experience may also be possible rather than deciding on behalf of the stakeholders and related communities.

Being consisted of two interrelated practices extended roughly over a month, workshop aimed at working with different groups who are related to and/or interested in heritage studies. An open registration call was made for participants through different social media networks and by local stakeholders in Heybeliada, where the mill is actually located. Some general keywords including *"human", "value", "place", "memory", "capacity"* along with more specific ones such as *"conservation", "participation", "industry"* were chosen in order to draw attention to the study. Therefore, the pre-registered participants appeared to be of heterogeneous backgrounds, yet, they consisted mainly of architecture and urban planning students, both undergraduate and graduate, with no direct relations with the mill.

The first leg of the workshop was designed as a semi-informal meeting in a free space working atelier where participants spend the day brainstorming about a wide range of topics regarding the mill. The main aim of this first leg was to understand how people value a specific place or site and to discuss heritage values as the basis for moving on to an understanding of how values influence what we do. Starting with more subtle subjects such as the general references of the mill and the sense that it evokes in the participants, and then focusing on more specific aspects like the risk factors, potentials, alternative future scenarios were on the agenda of the day.

The event was a semi-planned, yet flexible activity which consist of main sessions. The first session started with an introductory practice where the participants asked to form a heritage cluster (Figure 4). While forming a network, participants had to introduce themselves, pick a nick name that they use during the workshop and tell everyone the reason behind their choice. In addition to being a practical warm up exercise that helps people to get to know each other, exchange of personal details and being tied up to each other also meant to help cultivating a sense of community.

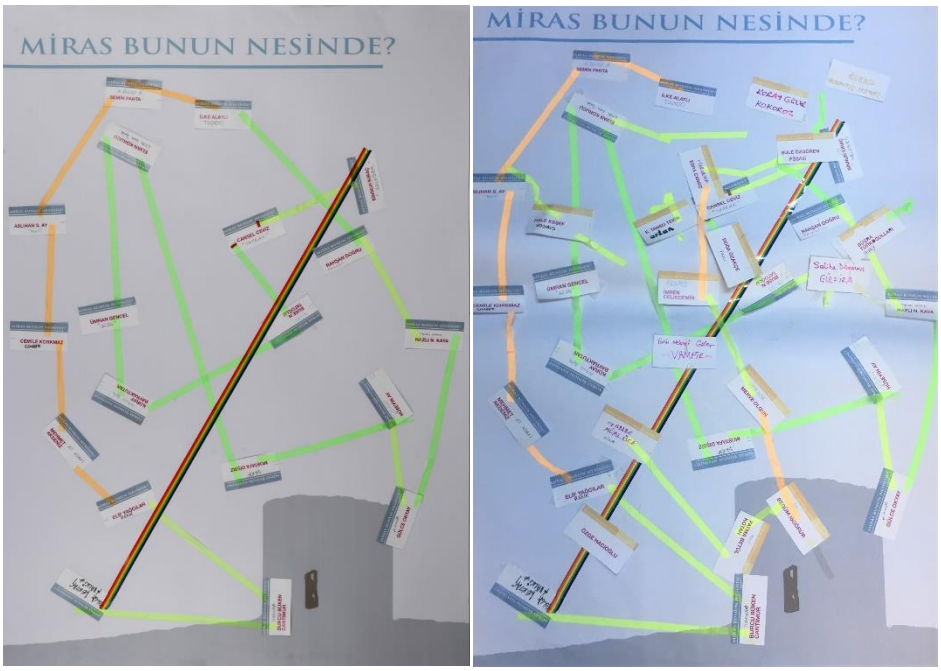

Figure 4 Heritage cluster network first and second legs (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

Following that, a brief introduction regarding the evolution and current state of the mill was made and the newly-formed cluster was asked to discuss the associative meanings/references they attributed. It was a rapid practice where all mentions were documented without any restrictions and further implications were fostered by the facilitators. In this exercise, some of the mentions were scrutinized thoroughly, even sometimes provocatively, in order to inspire a chain reaction to reach a nearly subconscious dimension of conservation. During the whole discussion, all findings were simultaneously recorded by one of the conductors in order to form a word cloud.

In the second session, the attendees were given a short seminar on heritage and values, their possible criteria for evaluation and shown some real-life examples. This part was designed as a more focused and area specific study that intends to lead the participants to contemplate further about the valuable architectural characteristics of the mill rather than any landscape element. This architectural focus also aimed at producing ideas on the tangible aspects of conservation studies as well as providing a basis for a more professional discussion based on specialized knowledge.

Cluster was asked to decide collectively on the values that the mill encompasses following the seminar while the responsibility of moderating the discussions were handed over to a volunteer from the community. By this means, the cluster was charged with striking a balance within their own structure and establishes their autonomous decision-making mechanism as well as adjudicating on the heritage values of the mill may or may not have. This assignment

enabled the cluster to think about numerous aspects related to heritage, both theoretical and practical, and seek a solution for existing conflicts while trying to build a consensus (Figure 5).

Figure 5 Scenes from the first leg of the workshop (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

The last part was mostly about questioning the most suitable scenario for the future of the asset. In this framework, the group discussed many alternatives for intervention, pros and cons of different methods, possible priorities of values within the context of social benefit for related communities. In this sense, this discussion was a pre-study for the upcoming leg of the workshop. After examining a number of potential intervention scenarios and their outcomes, the group avoided declaring a final proposal, but a general tendency was obtained.

Figure 6 Scenes from the second leg of the workshop (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

For the second leg, a day-trip was organized to the recreational area where the mill is located. Participants from the previous leg as well as first time attenders were present during this trip. The participants who attended the previous leg were relatively more familiar with the main issues regarding the mill. The on-going debate and brainstorming regarding its values; past,

present and/or potential were subjects they had already studied thoroughly. Therefore, they were additionally entrusted with transferring their pre-practiced knowledge and skills among the new members of the growing cluster.

Place-based oral history interviews, audio-visual recordings with people who have real life experiences with the mill and a heritage walk to monastery to further understand the contextual relationship were also planned within this trip (Figure 6 and 7). Additionally, participants also visited the mill's interior and roof, which used to be an observation terrace, and evaluated its current condition. Bringing together the professional expertise with personal experiences in order to explore different perspectives, scales, layers and motivations of conservation was the main objective of these practices.

Figure 7 Scenes from the second leg of the workshop (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

Prof. Dr. Baha Tanman, who have spent his summer vacations on the island for decades and have a substantial knowledge about the vicinity, and some previous inhabitants including Ms. Sönmez who was born there joined the group for an interview (URL1). Many stories, memories and highly personal details were exchanged during these in-place talks. Conjointly, an open-air forum with the participation of conservation specialists, people from local government and NGO's took place. The details of how the area has changed in years, its significance for the

dwellers, the mill's current state and use were discussed by local community members. It allowed participants to make a dialectical comparison between analyses from various perspectives and re-evaluate the previous findings in its original setting.

Findings and Discussion

It is possible to say that the study has many revealing findings and lessons. One of the most important highlights is the fact that even though most of the participants were architecture and urban planning students, the clusters' main motivation was mostly emotional rather than professional. When the references they mentioned were roughly classified in three groups as emotional, physically observable/descriptive and architectural, it was surprising to see that the least emphasis was made on the last. Even the short seminar on heritage values and/or an on-site visit did not affect the above-mentioned ratio.

Lacking a prior information regarding its function and history, participants' initial attempt to define the structure by the feelings it excite, can be considered as a search beyond the concrete existence of heritage. As a result of primary questions directed by the conductors, the participants may have thought that it was inadequate to describe the structure through its architectural identity and that the workshop may intend to follow a different route. However, the history of the mill -which was also defined as *"an effort to survive"* by the cluster members- as well as the discussion on the effects of time and use on the structure were other indicatiors of the emotional ties. The fact that the only professional references were *"stone", "historical"* and *"multi-layered"* while aspects like *"loneliness", "sadness", "distance", "forgotten", "melancholia", "in between"* mentioned repeatedly was suggestive in terms of observing approaches of a group specializing in architectural field. Additionally, their consensus on the protection of mill's current state and *"ruin"* aesthetic suggests that the decisions they made about the future of heritage also come from emotional causes rather than from functionality.

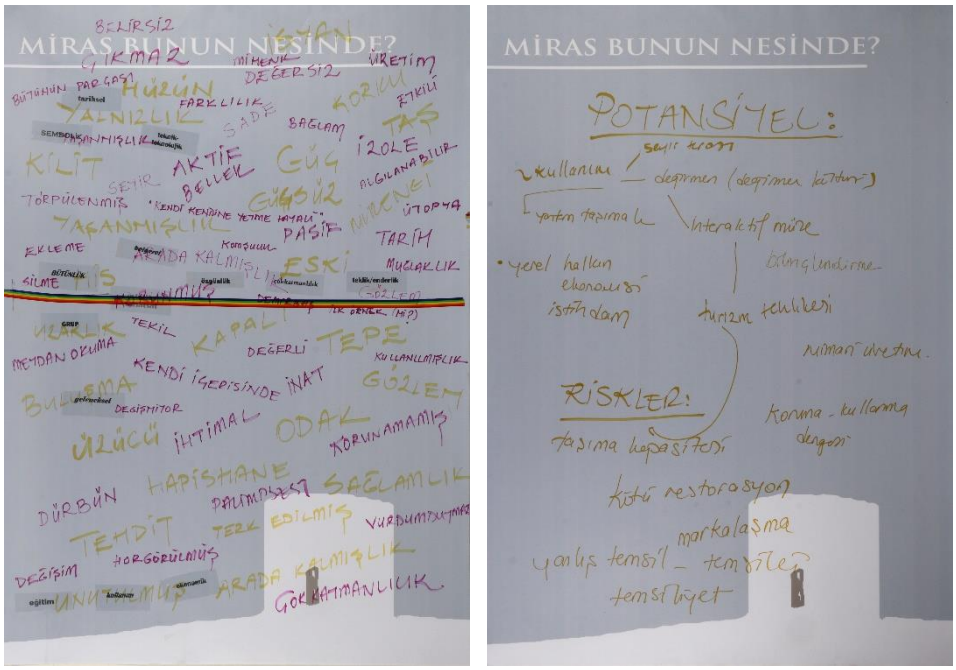

Figure 8 Studies from the first leg (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

Interestingly enough, an intense discussion environment, which fosters the exchange of various ideas and collective interaction, developed during value evaluations. It can be said that the main discussions were focused on for whom, in which period, in what context and scale that heritage is valuable. Provided that the existence and continuity of use were the first criteria on the values; integrity, historic and symbolic values of the building were among the most salient. Likewise, the problematique of authenticity, as one of the fundamental with regards to the significance of heritage, inspired one of the most intensive exchanges between undergraduate and graduate participants. It is also noteworthy that educational, economic and traditional values were seen as potential values and in fact the term potential value itself was clearly recognized by participants. This general framework with respect to a high level discussion is thought to be directly related to the participants' profile and their qualifications.

On the other hand, aesthetic, rarity, and group values with relatively more subjective qualities were among specific areas where different opinions are expressed. For instance, it is quite successfully noted that these structures were not constructed with aesthetic concerns and therefore, the aesthetic value must be questioned through the production identity. Similarly, contextual variability of values was discussed and evaluated through scale problematique with regards to rarity value just as past-present-future layers to technical and use values. In this framework, the period during which the structure was built and the necessity of understanding its function, as well as the issues of sustainability and casuality were long and detailed discussion topics. Traditional value, which was also evaluated through production (flour milling), was also stated to be important as a meaningful reminiscent of the past. Based

on all these highlights, the multi-layered approach to value and heritage adopted by the participants is extremely formidable (Figure 8).

While discussing the relationship between the single structure and landscape, opposing concepts of integration and separation were brought up on the agenda. The cluster agreed that the mill continues to exist as an unchanging element of the silhouette, in spite of the changing social and physical environment. Nevertheless, it has lost its significance today while being contextually meaningful in the past with the monastery and agricultural areas in the landscape. Adding to the existing paradox, local descriptions give little space to the mill itself in the assesment of the tangible and intangible values around the area. This is an interesting reflection as well as a contradiction of the significance of the mill within the context of the continuity although it does not have a strong place in the memory of the local population.

Another deeply evaluated aspect was either reusing the structure as a mill, observation terrace and/or museum or making no intervention at all. In this context, the topics including economic benefit, employment growth, educational value, proper conservation-use balance and the risks of tourism and poor restoration were among discussed. Even though, it is questionable that the participants of the workshop reflect the opinion of the majority of different groups living in Heybeliada, NGO representatives advocated the preservation of the current status while some of the local inhabitants proposed an adaptive reuse that supports local production possibilities. However, the notion of an utilitarian approach for both society and the heritage itself were commonly shared by all participants.

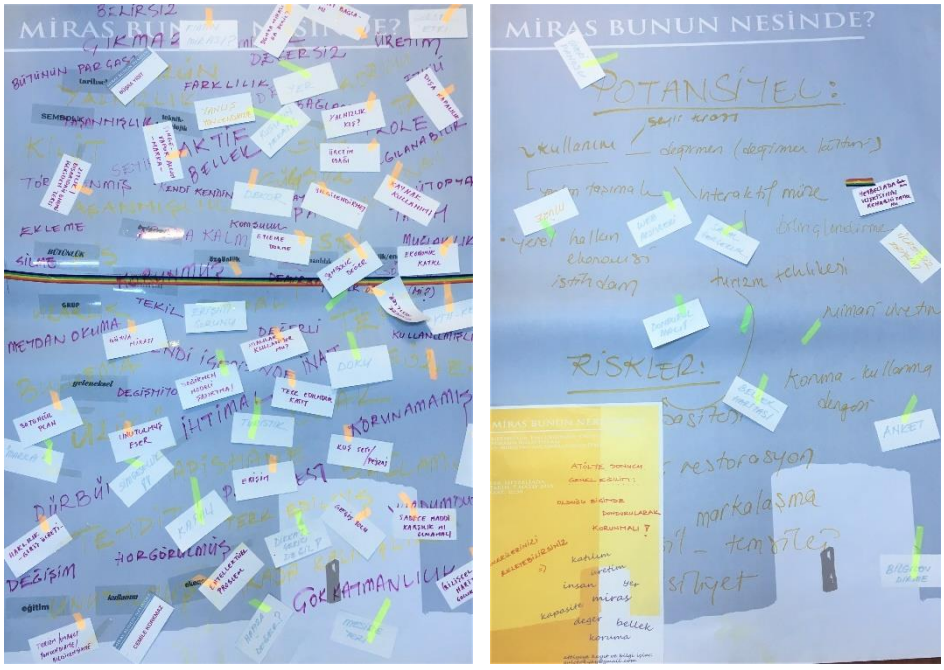

Figure 9 Studies from the second leg (Cantimur, B.B., Kıraç, A.B., Okyay, G.G., 2018)

Evolving from adaptive reuse to minimum/no intervention, the clusters' final consensus was quite decisive and compound given the current situation. The need for reintegration in case of reuse seemed to be the main unfavourable perspective here, due to the negative consequences of reconstruction practices throughout the country. Contrastingly, the intervention proposal that had made previously by the team from Mimar Sinan Fine Arts University and approved by the Conservation Board was to partly reintegrate the structure and rebuild its inner mechanism in order to make it functional again. Justified by the educational and technical values of the mill, this idea aimed to sustain a prominent figure and one of the rarest examples of its own kind within the close vicinity (Figure 9).

"What is the Heritage of It?" also demonstrated that experiencing a cultural asset in its authentic place may have substantial effects. Since nearly any of the cluster members had not have any previous real-life experiences with the mill, their dominant tendency at the end of the first leg of the workshop was to reuse it as a museum. However, after visiting the area, they decided to protect the mill in its current state, mostly for its symbolic meaning. The intervention, in their perspective, should mostly focus on larger scale aspects such as creating a proper route for visitors, allowing more accessibility –at least for local dwellers- and enhancing presentation and interpretation techniques for providing better information about the history of the building.

Moreover, it is an undeniable fact that the presence of graduate students among the participants improved the quality of the discussions in general. The final and collective mentions of the terms such as "*memory", "identity", "context", "production", "change", "integral"* and *"valuable*" are important to show that heritage workshops can be useful in creating awareness in different groups. This aspect has been also emphasized by the participants while evaluating the achievements of heritage workshops, in addition to providing an atmosphere of sincerity, establishing relations among various users and forming different opinions. The fact that nearly all of the participants stated that they would, in fact, like to attend more heritage workshops similar to this one were a clear indication that it was regarded as a positive experience. During the initial phases of workshop, it was repeatedly mentioned that the mill was devalued and isolated by its own people. At the very end, it seemed to have a big heritage cluster, and in fact, is no longer alone (Figure 10).

Figure 10 The old mill and the heritage cluster, (Güler, K., 2018)

Conclusion

In this paper, it is argued that social value and public participation have become increasingly prominent in international heritage frameworks and the conservation policies, even though they remain relatively marginal in many areas of practice. Irina Bokova, the Director-General of UNESCO, declared in 2012 that culture is what makes us who we are, providing answers to many of the challenges we face today and that we must do far more to place culture at the heart of the global sustainability agenda (UNESCO 2012a; Hayashi et al. 2013). Meanwhile, Duxbury (2012) claims that cultural sustainability involves efforts to preserve the tangible and intangible cultural elements of society in ways that promotes environmental, economic, and social sustainability. In a similar way, recent approaches have been distinguished themselves at the explicit integration of culture in the definition of the UN 17 Sustainable Development Goals (SDGs) in 2015. ICOMOS's involvement with the SDGs materialized through Target 11.4 (the 'Heritage Target') to "protect and safeguard the world's cultural and natural heritage" and highlighted the role of heritage within Agenda 2030.

Sharing a congruent theme, European Year of Cultural Heritage: 2018, where the past meets the future, is about cherishing and honouring our past in order to build a new and common future for younger generations. This possible future shared and valued by different

communities has its roots on the notion that heritage is the right and responsibility of every individual on an equal basis. This contemporary approach also necessitates adopting new means of dialogue that allow related communities to take initiative for heritage as responsible agents.

The divergence between the initial intervention proposal made by experts and the consensus of the workshop, What is the Heritage of It?, clearly indicates that participative manners in conservation practices may lead to different approaches. Although the need for another workshop that aims to further discuss and shape the ideas regarding the future of the mill also worth considering, the quest for alternative approaches to heritage and increase of pluralistic debates that empower communities turned out to be vitally important. Creating a common ground and bridging the gap between different –and highly personal- perspectives can foster making human-focused decisions while developing autonomy, sense of community and consensus among communities.

As Kaplan (2001) very accurately emphasizes, the system will not change all at once, but through individuals who begin to make that change happen by challenging the conventional, and experimenting with new forms of practice. In this light, generally accepted understandings, value sets and approaches on heritage conservation must be scrutinized thoroughly by alternative practices. Collaborative methods involving heritage professionals and communities in a network of on-going relationships with heritage can be considered the most productive in this sense. Being also a participative approach, they can create a more dynamic relationship between heritage and its context as well as improving the knowledge, skills, abilities and behaviour of individuals and communities who are directly involved in the protection and management of the heritage (Leitao 2013). Ultimately, the creation of an appropriate framework in which participative initiatives, or 'heritage communities' as identified in Faro Convention, can grow and be maintained in the long term is essential for sustainability.

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URL 1: https://www.youtube.com/watch?v=hq8EYQc07Zs

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Hybrid Biomimetic Design for Sustainable Development Through Multiple Perspectives[1]

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Abstract

In the bio-technological era the boundary between the biological world and synthetic world is increasingly fading, as well as, the limit between different disciplines in the perspective of multidisciplinary and anti-disciplinary.
Conversely, the overcoming of barriers is not to be considered as a symptom of homogenization or loss of complexity, but rather, as a paradigm, in which new forms of connection and intersection between design and science are created. In this vision, hybrid products can be generated in which nature and artifice co-exist: a change of paradigm that deeply revises the concept of environmental sustainability.
This paper aims to illustrate activities, methods and results of the Hybrid Design Lab-(HDL)- Department of the Campania University "Luigi Vanvitelli"- specifically dedicated to different forms of collaboration and intersection between design and bio-sciences, specifically aimed to environmental sustainability.

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1. Introduction

Presently, bioscience and biotechnology evolution prompts the dissolution of the frontier between the biological and synthetic world providing new opportunities for nature and artifice to cooperate and hybridize (Langella, 2007).

As a discipline, design is highly involved in decoding social, economic, scientific and technological transformations under the form of new productive solutions. This conceptual mutation is to be considered a possible opportunity to materialize new design system inspired by nature in the creation of products and processes integrated with environment. New bio-technological solutions aimed to repair human tissues and organs; systems to repopulate endangered species; bio-sensing systems able to detect human and environmental disorders and diseases: all examples of cooperation between humanity and nature able to realize new forms of propulsive sustainability; *i.e.* an improvement of past protective and conservative sustainability concepts (Mansel & Berger, 2017).

In this regard, environmental sustainability is not only considered the reduction of the human activity impact on the ecosystem or the ability to conserve resources; but also as the capability of developing new forms of human cooperation and integration with nature. In this vision, sustainability is transformed in the ability of science to "regenerate" and "enhance" nature (Mehaffy & Salingaros, 2017).

Design has become part of sustainability culture during a historical moment in which environmental degradation, inducted by human activity, emerges as a fact and begins to be officially cautioned and counteracted by the United Nations *via* protective environmental actions, environmental resource management and sustainable projects (Tyagi, Garg & Paudel, 2014). Successively, design for sustainability extended its intervention from product and service life cycle impacts to wider material and immaterial dimensions such as experience, lifestyles, consumption and behavioural models (Vezzoli et al. 2017). Thus, design begin to focus on all the aspects that are directly connected with user-product relations *i.e* how products are loved and taken care of by users, or how products are resilient, adaptable, reactive and capable of self-organization to respond to society changes. Interestingly, these qualities and principles can be observed in nature, and are connected with something that can be defined as “intelligence” of natural systems from which the sustainability culture can be inspired.

Nature can help sustainable design not only teaching how to save resources or the way to realize lighter and structural optimized artefacts, but also showing the life principles

responsible of component integration and cooperation to create efficient resilient systems (Lucibello *et al*., 2018).

Sustainable design must study these principles, as well as, the best way to transfer them into the project. In order to do this, it is important to establish a close collaboration with biologists.

The *Hybrid Design Lab* (HDL) has extensively experimented these new design frontiers through the development of an innovative biomimetic approach, in which designers and scientists collaborate together to obtain innovative and biunivocal results. The HDL biomimetic projects are carried out in collaboration with different fields of science, especially the biological sector, and are aimed to better understand the relationship between morphological, structural and behavioural features of natural systems (with all the "motivations" behind them) and to transfer functional details and principles into the project for realizing new sustainable hybrid design products.

In the HDL, the concept of sustainability is considered as a dynamic form of adaptation to the emerging needs of human beings. In nature, the evolution of species induces the development of new characteristics, systems, and functionalities, that make organisms increasingly adapted to the environmental change; in a similar way, design can drive the evolution of products to be more adapted for market environment and human needs that are equally subjected to quick and radical changes caused mainly by technological advancement and socio-economic dynamics.

The hybridism is the key of the HDL for this new sustainable direction and it is correlated to the creation of products that emerge from the hybridization between biological and synthetic dimension, as well as, between the different competences and disciplines that made this possible. The HDL involves designers, chemists, biologists, engineers, neuroscientists and even psychologists, who work together with the aim to bring the most advanced scientific discoveries closer to people's everyday life through the development of new design products that try to respond to emerging needs of contemporary life.

In order to facilitate the dialogue and collaboration among researchers coming from these highly different contexts, for each HDL project it is important to clearly define common objectives, common languages, as well as establish emphatic relations. This approach can bring progress and advantages in both science and design field creating mutual and bi-univocal collaborations.

2. Hybrid Design. A new vision of sustainable innovation

Since 2006, new forms of mutual collaboration between design and life sciences have been experimented in the HDL (Langella, 2007). In this association, biology provides inspirations and strategic principles drawn from nature resulting in a sustainable innovation of product~~s~~ and processes (*e.g.* manufacturing innovation driven by new forms of adaptability, flexibility and resilience); design, on the other hand, helps biology to approach society and its dynamic needs translating functional aspects of their research of natural systems into new products (Langella, 2019).

The results of this biunivocal interaction are original biomimetic products, in which principles, strategies and structures of natural systems are transferred into the design of more sustainable artefacts (Kennedy & Marting, 2016), suitable to complex and changing needs arising from the transformations of society *e.g.* the intensive use of technologies, the aging of the population, the dynamism of people.

In other terms of sustainability, biomimetic design can even contribute and support studies in bio-diversity and endangered species preservation. In fact, all the interpretative and representative biology and design tools provide useful contributions to morphological, structural or functional studies of biological systems aimed to understand and counteract the effects of climate change, human intervention and pollution. Biologists carry out different studies and practices for restoring damaged or destroyed ecosystems and habitats. In this context, the designer can help biological research providing new tools such as 3D models and printings. As an example, 3D printing technology is presently used for coral reef restoration: reefs are dying out and, as an alternative intervention, many researchers are turning to 3D printing in support of their restoration. In this light, the Australian group “Reef Design Lab” designed a modular reef structure printed in ceramic submerged in the Maldives in August 2018 (presently the largest printed reef in the world).

The approaches and methodologies used in HDL are continuously updated in function of the scientific research and literature evolution and adapted to specific standards *i.e*. biomimetics ISO TC / 266.

HDL methodology applied in biomimetic design projects foresees two possible different approaches: *Biology to Design* and *Design to Biology*. The first proposes natural models induced by biology to design projects that correspond to the approach also defined as *solution-based* (Badarnah & Kadri, 2015), *solution-driven* (Vattam et al., 2007), *biology push* (ISO / TC 266 2015), *biomimetics by induction* (Gebeshuber & Drack, 2008). The second approach commences from specific design problems and explores the most suitable solutions in nature, an approach also defined as *problem-driven* (Fayemi et al., 2017), *problem-based*

(Helms, et al., 2008), *challenge to biology* (Baumeister, 2014), *technology pull* (ISO / TC 266, 2015), *top down* (Speck, et al., 2008) or *biomimetics by an alogy* (Gebeshuber, 2008).

In the HDL biologists and designers operate in conjunction; through the observation and subsequent interpretation of biological subjects -using optical microscopes, scanning electron microscopes and x-ray tomography- they deal the phase of study nature. The choice of perspective and details to observe are strongly oriented by design according to the project's aim. The interpretation of instrumental images is also conducted in cooperation and translated into nature models (Chakrabarti et al., 2005). These could be 2D or 3D, static or dynamic, virtual or physical, and are mainly obtained using digital tools; they represent biological structures, their behaviour, movements and functional elements that could possibly be transferred to the product project.

3. Biology to Design

This approach regards all the cases in which biologists, for increasing exploitation or communication of their research or achieving other strategic aims (*e.g*. the safeguard of endangered species), propose to designers the possibility to transfer new interesting functional characters deduced by their research into the project of artefacts (Badarnah & Kadri, 2015; Vattam et al., 2007; Gebeshuber & Drack, 2008).

The steps proposed for this approach are:

a) Selection of scientific content to be translated into products

Biologists, after identifying the potential transferable contents of their research, submit to designers the scientific motivations of their choice of which they verify the applicability in design driven sectors. In this initial selection, to ensure the scientific relevance of the project, it is particularly useful to choose innovative topics, such as research content with high international value due to its discoveries, primates and innovations that can be attested by official rankings and bibliometric parameters.

b) Intersection meetings, representations and coaching

In this phase, designers deeply explore the scientific contents that must be transfer supported by biologist. Designers can be facilitated by visiting the biologist research institution, where the can "live" directly the environments, protocols and approaches of the research. These are particular meeting sections, defined as "intersection meetings" and oriented to identify objectives and shared languages (Chiu & Shu, 2007), as well as, to acquire research data in an experiential manner. Biologists can also offer a selection of the most relevant scientific

literature of their research, possibly using a more accessible language (Nagel *et al.,* 2010), and provide sketches or diagrams of the main representative concepts. These sketches are redesigned and reinterpreted by designers, who schematize them into 2D or 3D natural models that visually and descriptively reproduce principles (Pahl and Beitz, 1996), phenomena, functions, processes and structures that may be transferred.

Hybridization of biological characters to be transferred. After the in-depth step, the analogy approach between nature and artefacts (Moreno, Yang & Wood, 2014) is applied. This is carried out by the "analogy transfer matrix", in which biological systems opportunities and limits can be correlated with design products to foresee different possible application scenarios according to the evolutionary needs of market and society (ElMaraghy & AlGeddawy, 2012). It can be figure out as a cartesian system in which are assigned: at the ordinates, the biological elements with their potentially transferable characteristics (*e.g.* iridescent / camouflage effect; porous structure / filtering; stratified structure / structural optimization; etc.); at the abscissas, the corresponding design analogous problems of artificial products that can be solved with biological solutions, for example chromatic variability, breathability, lightness, resistance, etc. Thus, based on the emerging matrix systems and market requirements evaluation, designers can easily elaborate different innovative concepts of products.

d) Proposal of new concepts that interpret, express and enhance science

These design concepts are then submitted to scientists in order to validate them, and evaluate together the most appropriate areas of application identifying potential production partners interested in bio-inspired innovation opportunities.

e) Development of the project

In this phase, the project of products is developed based on the nature models (Chakrabarti et al., 2005). It is important that designers remain coherent with the nature principles that have inspired the project; thus, to support this, the "coherence matrix" must be realized. In this matrix are considered: the application field (e.g. furniture, lighting, fashion, biomedical, sports, tourism and cultural heritage, food, etc.), the type of product and the specific design issues addressed to productive and user needs inspired from biological solutions.

f) Prototyping and feasibility

Once verified the project coherence by checking the matrix, it is possible to define the final project (possibly in collaboration with the scientists), and translate the concept into products. In this phase, prototyping takes a particularly important meaning, because it is configured as

a planning tool, as well as, a verification tool. Details, ergonomics, materials and processes are mainly defined in the physical modelling phase, through a direct approach to the project. Generally, different types of models are created corresponding to progressive degrees of definition, which are then verified and evaluated through tests that involve in some cases the stakeholders to assess specific aspects such as usability, satisfaction of needs, etc.

4. Design to Biology

In this second approach, design search in the biological field the answers to problems (Fayemi et al., 2017; Helms, et al., 2008; Baumeister, 2014; Speck, et al., 2008; Gebeshuber, 2008). These problems emerged from specific requests and needs of companies, institutions, market and society, their solutions can be found by analogy of function in natural systems. In this approach, biologists are selected and involved according to the chosen topics. From this point of view both design and biology are conceived as strategic problem-solving cognitive activities (Farrel, Hooker, 2014). This approach is the one most frequently used in the design and engineering professional activity or in the companies that generally rely on a problem solving approach.

For Design to biology, the proposed steps are:

a) Biomimetic design brief

Designers, autonomously or hired by company or other institutions, elaborate a brief according to needs that are not sufficiently satisfied by existing products.

Once identified the unsolved design problems, a “matrix of analogies” is elaborated and completed in a similar way to the “coherence matrix” of the first approach.

In this matrix are identified: application sector (e.g. furniture, lighting, fashion, biomedical, sports, tourism and cultural heritage, food, work, etc.), type of products and the specific design issues raised by market and society (ElMaraghy & AlGeddawy, 2012). It is necessary a statistical surveys based on data collection or interviews aimed to deep identify the point of view and needs of users.

b) Design research and scientific references

Beginning from the matrix of analogies, it is necessary a deep online research on existing products that respond to the identified needs, and list their respective limits and opportunities (highlighting the reasons for which they do not fully satisfy the identified problem). Thus, in this phase, a list of products is draw up inserting the name of designer, company, target market, solving strategy of design problem, technologies, materials used and cost.

Then, the moment to query nature comes. Through an online researches of words and key concepts (with strategic-planning intent) and the expert biologist consultation, designers can select different scientific references of natural systems that seem to contain in their logics, structures and behaviors, the solutions necessary to solve analogue design problems. For this purpose, designers need to ask specific questions, trying to investigate different areas of biology at different scale by searching possible bioinspired solutions on generalist or specialized platforms using specific keywords. In the case in which designers involve biologists, the research of natural solutions occur through specific intersection meetings illustrated in the previous Biology to Design approach. In such circumstance, biologists, led by designers to search in specific directions, find the most appropriate biological references to be use as models (generally, employing less time). Once identified the natural solutions, biologists can also provide more detailed scientific information by inherent scientific articles, graphs and data.

c) Design strategies and references in-depth

Once selected and analysed design references products with all their limits and advantages, designers can identify the areas of intervention to realize new concepts e.g. possible scenarios to propose new solutions for unresolved problems, related use / experience models and other design strategies to be pursued. Based on these elements, (which implement the matrix of analogies), the analysis of scientific references can be deepened identifying the biological principles and knowledge from which draw inspiration, as well as, the modalities of biological transfer and the possibly to collaborate with expert scientists. The intersection meetings, begun in the previous phase, and the activities of representation and interaction with scientists (as it is illustrated in the Biology to Design approach) continue and intensify in this phase. Also there, it is important that designers and biologists collaborate sharing solutions and objectives in order to achieve mutual advantages. At the same time, the project must converge to feasible and achievable results considering the technologies of productive process and the economic point of view.

The following phases coincide with those of the Biology to Design approach:

d) Proposal of new concepts that interpret, express and enhance science

Taking into account all the previous steps, designers can proceed to the definition of one or more concepts that respond to the design scenarios hypothesized using the matrix of analogies. Different design concepts are then proposed to biologists, who check the consistency and coherence with the scientific principles, and to the companies, which ascertain their usefulness and feasibility. After these validations derives a single concept that is launched to project phase and developed in the demanding producers and users context;

when it is possible, a human-cantered approach is advisable, consisting in focus design process on personal, human characteristics of users via interviews, observations, in-depth investigations. The chosen concept is generated by the assessment and integration of: needs, existing solutions, biological references, selection of strategies and processes to be transferred.

e) Development of the project

Starting from the initial science models, the project is generated through different degrees of definition. At this stage it is important that the work of the designers remains coherent with the scientific principles that have generated it. The checklist of the matrix is elaborated.

f) Prototyping and feasibility

Through the matrix of analogy, it is possible to define of the final project (possibly in collaboration with the scientists, companies and eventual representatives of user category), and translate of the concept into the final product by modelling, prototyping and feasibility assessment.

5. Biomimetic Driven Innovation

The HDL pay particular attention to processes, in both *Biology to Design* and *Design to Biology* approaches. In order to reach original trajectories, designers are induced to pursue hybridizations even between different processes, tradition *versus* innovation, materials. For this reason, different prototypes are developed, starting from more theoretical and conceptual models up to final products that can be reproduced in limited or massive series by the company.

In these approaches, it is important that the project raise the interest of science. The translation of science principles into projects is not just a goal of designers, but made it significant also for scientists that can see how their research is transformed into innovations, products and start-ups. The role of designers as facilitator and indispensable actuator in these processes can motivate scientists to collaborate with.

6. Resulting Products and Discussion

One of the most interesting references in the field of biomimicry is the *Biomimicry DesignLens* which suggests to designers some principles of life used by nature which can be used in design *e.g.* use life-friendly chemistry; be locally attuned and responsive; adapt to changing conditions; evolve to survive; integrate development with growth; be resource efficient and related strategies like break down products into benign constituent; use feedback loops;

embody resilience through variation, redundancy, and decentralization; cultivate cooperative relationship; self-organization (Biomimicry Guild, 2016). In the HDL, all these principles, as well as, other strategies identified during observation of nature and experimentation in lab, are considered and translated. Thus, the resulting products are sensibly variable in their conceptual essence, logical process and sustainable aspects: waste ennoblements, new materials, reacting to environmental factors, integration of biosystems, characteristics and principles bioinspired.

6. 1. + Design – Waste

Nature reduces wastes and reuses all its waste following a closed loops. The project "+ Design – Waste" is aimed to learn from nature the ability to recover and regenerate materials and energy ennobling by design the waste in order to raise the final economic value through the realization of products such as jewellery, furniture, fashion accessories for which people is willing to pay a cost that makes the upcycling process convenient.

The HDL designers analyse the production cycles of different activities, especially local ~~productive~~ processes, identifying the typologies of waste in terms of quality and identity, as well as, their potential in form of new products. Also the limits and the weakness are seen as opportunity to identify the best sector of application.

In the *Diaglass*[1] project, waste glass were upcycled and enriched with gold dust through a process of heating becom~~i~~ng precious jewels. The concept was inspired to diatoms (fig. 1). Similarly in the project *Nature Imprinting*[2], volcanic stone powder, incorporated in polymer clay, was used to make jewellery obtaining the shapes from molds realized imprinting natural textures like cabbage or corals imitating the natural process (fig. 2). Disused glass sheet was also aesthetically valorised in the project *Innesti* with the embedding of plant partly burnt that leave a suggestive slight visual trace. The process was inspired by the fossilazion processes[3]. Another project of waste ennoblement was *Fragmens*[4]: waste from a marble company was retrieved and used to make jewels inspired by Pompeian jewellery. In all these cases the waste materials that has a very low value becomes precious (fig. 3) .

1 Design: Serena Miranda; Scientific coordination: Carla Langella.
2 Design: Livia Sorgente; Scientific coordination: Carla Langella.
3 Design: Michela Carlomagno; Scientific coordination: Carla Langella, tutors: Francesce Dell'Aglio, Enza Migliore.
4 Design: Francesca Liquori. Scientific coordination: Carla Langella, tutors: Francesce Dell'Aglio, Enza Migliore.

In the exhibit project *Mute Azioni*[5], with a more figurative way of wasted material, the tragic fire of *Città della Scienza* Museum have been interpreted through an interactive installation in which materials involved in the fire conceptually tell the story of their experience and trauma. With the help of a chemist and a psychologist, the exhibit was designed to show how the different materials, as well as different people react to traumas. Some people come out of the traumatic experiences more tenacious than they were in the past, other people change their external appearance becoming without changing inwardly, and others are modified in their intimate essence. Similarly, it occurs in materials that go through a catastrophic event. The project was carried out as part of the international exchange with the California College of Arts of San Francisco led by Mariella Poli. Italian and American students worked in the museum area for a week and proposed various different ways of narrating the history of materials through works of art, communication products, new materials for the new museum and interactive exhibits. (Langella, 2015).

6.2. Sustainable Biomedical Design

HDL products characterized by reduced life cycles, such as orthopaedic supports used in a limited therapy time, are designed in a planned degradation *i.e.* releasing substances that are not only less harmful but also benign for the environment thanks to their fertilizing, balancing and regenerating properties. *Thumbio*[6] *i*s a perfect example of these promising product (fig. 4) it is an orthopedic brace for therapeutic immobilizations of hand and wrist in case of inflammatory and degenerative diseases. It is made with a biodegradable bioplastic based on starches and waste liquid from the production of buffalo mozzarella, functionalized with natural anti-oedematous and anti-inflammatory herbal ingredients and reinforced with hemp fibres. The advantage of bioplastic in a brace is relevant since this type of therapeutic supports, generally made with conventional polymeric materials, are used in the acute phase of the pathology and then dismissed. Therefore, the life of this product, is quite limited and, for hygienic reasons, is unlikely to be reused by others. For this reason, it is highly

5 *Mute azioni* was the italian design section of an international workshop developed inside the *Summer Study Abroad in Italy* titled *Environmental Dialogs* ideated and realized by Mariella Poli of California College of Arts, in collaboration with Hybrid Design Lab , Città della Scienza. And le Nuvole. The italian students were tutored by Francesco Dell'Aglio, Nicola Di Costanzo and Francesco Amato, coordinated by Carla Langella. The workshop was held in the june 2015 in Città Della Scienza, Napoli with the scientific contribution of Dario Aquilina (psycologist), Mario Malinconico (chemist, IPCB, CNR), Fabio Borgese (creactivitas) and the support of some company: 3D Factory, Enjina, Hiltron

6 Design: Clarita Caliendo; Coordinator: Carla Langella, developed with the collaboration of Carlo Santulli and Antonio Bove.

advantageous to use a biodegradable material. *Thumbio* was developed by the collaboration of designers, material scientists and an orthopaedist which advanced an unusual bio-composite: multisensory, coloured, thickness differentiated, singular textures and transparencies, functionalized with active phototherapeutic components in form of roots, leaves, fibres or flowers for topical use.

6.3. Designers in lab: new bio-based bioinspired material

The HDL dedicates particular attention in the research of new materials in order to obtain new sustainable solutions enhancing the natural materials and interpreting their biological multi-functionality in a singular design view. The relationship between design projects and nature is here bivalent because the new materials contain natural component, but are also inspired by principles and logics of natural system where they evolved. Complex qualities of nature are translated into the hybrid material such as cyclic life, adaptability, self-organization, redundancy, stratifications, non-homogeneity, porosity and hierarchical organization (all characteristics that make them suitable to meet the complex needs of contemporary design). In the HDL, these projects were developed directly by designers in laboratories of chemical institutions in collaboration with chemists and engineers of matter. Designers bring new points of view to chemistry and new visions leading to sustainable innovations that can respond to market demands. This deviation from conventional biomaterial research brings results also for chemical scientists who discover alternative and unconventional innovations. The research is here not limited to development and creation of new material or material system, as usually happens in chemical laboratories, but also reaches direct application into products that verify their feasibility and usability properties. In the project *New materials form the sea*[7] (European project PIER in collaboration with the IPCB Institute of CNR) 60 new materials were developed by HDL designers in a chemistry laboratory with this bio-inspired design approach embedding components of marine organisms such as algae, diatoms, crustaceans, mussel valves (fig. 5). The materials obtained are highly sustainable and emulate the complex properties of natural materials, resulting in non-homogeneous, anisotropic and multi-chromatic materials specifically tailored to be applied in lamps, accessories, furnishing elements.

7 Design Francesco Amato, Clarita Caliendo; coordinator design: Carla Langella; coordinator material science: Mario Malinconico.

6.4. Interact with nature

Hybrid products are designed to constantly adapt to external changes and feedback loops. This approach corresponds to HDL products that incorporate materials that can react to environmental factors such as humidity, light or the presence of polluting factors, by modifying their characteristics and performances.

One of the first projects of this field was Edo, a photovoltaic shelter inspired by the physiological processes of diatoms to extract energy from the sun to perform photosynthesis. The concept proposed is a multifunctional shelter that provides shade during the day, light at night, energy to charge portable devices and information on environmental data aimed to sensitize people on the atmospheric pollution. The project was awarded with an honourable mention in *The best image of the year 2008* competition promoted by the journal *Science* and the *National Science Foundation* (De Stefano, Langella, Auletta, 2010).

6.5. Nature inside the process

In the HDL nature is not conceived just as a source of raw materials, but also as component of the product and its realization process.-Biological and synthetic components coexist in hybrid products, triggering synergistic and cooperative relationships according to a co-evolutionary and mutualistic approach. This happens, for example, in a photovoltaic lamp that incorporates the natural sponge *Euclpetella*[8] activating a cooperation between natural factors, such as solar energy and the sponge ability to act as "biological optical fibres" focusing the light, with artificial factors such as photovoltaic panel, resin and digital manufacture processes (fig. 6).

The result of a synergy between nature and artifice is also the lamp *Loofalight*[9] in which are integrated: recycled component, coming from the recovery of a disused appliance, natural component (the loofa), cultivated by the user, and designed component that guarantees the universal connection between the elements (7).

Another example is the *fruit packaging DIApaper*[10] that responds to the need to eat healthier and to increase fruit consumption. The folded structure inspired by origami allows ~~you~~ to transport a single fruit in a mechanically protected way. The packaging paper has been

8 Design: Simona Sbriglia, coordinator design: Carla Langella; parametric design e 3D model: Gabriele Pontillo: Biology: Valentina Perricone.

9 Design: Piera di Marino, coordinator design: Carla Langella.

10 Design: Mara Rossi, scientific coordinator: Carla Langella.

specifically designed also to increase the fruit life thanks to the inclusion of diatomaceous earth flour (diatomite) able to absorb substances responsible of the fruit rotting processes.

Another natural component that has been functionally integrated for the realization of innovative products is the hemp. “Hempy Campania” is a project aimed to promote the basis for hemp production retrieval in Italy and a "design based" creations that reinterpret it as traditional material. Hemp is indeed a material of the past, however, for its properties of renewability, profitability, multi-usability, ability to regenerate land, it is proposed as an ideal material for a sustainable future. The examples of products born of this project are numerous, including benches[11] (fig 8; fig. 9), lamps[12] (fig. 10) and jewels developed using untreated hemp fibres, while with the fabric were created new bags and multi-functional clothing.

6.6. Biological flows in design

The HDL experience and research is also resulted in new forms of hybrid activities aimed to reduce environmental impacts of society and market through the integration of the multiple discussed paradigms of sustainability. The generative bio-inspired approach applied to design process, assisted by parametric modelling and digital fabrication technologies, allows to develop a new generation of hybrid products that are customizable (on request) adhering to specific needs, optimized in terms of consumption of matter and energy, therefore more sustainable. The hierarchical structure of properties such as porosity, density; elasticity, makes designed products able to adapt more easily to changing conditions and to different types of loading and stress distributions.

An excellent example is the bioinspired bicycle helmet[13] designed to increase the performance of sportive helmets imitating the hierarchical and alveolar structure of the diatom cell valve able to reduce weight, improve breathability and absorb better the energy of potential impacts. The helmet is made of three layers in different materials printed in 3D and joined together by a ribbing as happens in diatoms.

The inspiration to biological structure regards not only the mechanical behaviour but also the hydraulic behaviour. In the project *Aguaviva*[14] a hydroponic vase inspired by the hydraulic

11 Hempbench. Design Angela Bonanno, scientific coordination: Carla Langella. Pancan. Design Domenico Napolitano; Scientific coordination: Carla Langella, Biology: Valentina Perricone.H

12 Hemplamp. Design Nicola Esposito, Laura Guarino; scientific coordination: Carla Langella.

13 Diatom Helment. Design: Paula Studio (Valerio Ciampicacigli e Simone Bartolucci).

14 Design: Valentina Pianese; Scientific coordination: Carla Langella.

structure of the pharyngeal basket of tunicate was developed to reduce the consumption of water necessary for the cultivation of domestic plants (fig. 11).

In addition to the described mechanical properties, some HDL products embody other characteristics and principles inspired by nature such as the variation, redundancy, and decentralization strategies.

An example of this principles is the HDL *Auxetic neckbrace* , an innovative solution for tech pathology correlated with the intense use of digital mobile devices (Parasuraman, 2017). Women are more susceptible to this pathology and must be assume a correct neck posture wearing a collars for about 10 days (12). The design solution arises from the need to overcome the discomforts caused by existing cervical collars, such as the lack of breathability and freedom of movement, the non-adaptability to different anatomies, the difficulty in carrying out some daily activities and, finally, the outward appearance that does not facilitate its daily use (Santulli & Langella 2016).

This project proposes a collar for women structurally inspired by the auxetic structures observed in the skin of salamanders and other reptiles that allow large expansions without breakage. It is a geometrical property that determines an atypical mechanical behaviour: when the structure is pulled, it expands in the four directions and, when compressed, it compresses in all four directions. Thanks to this property the collar is particularly comfortable continuously recall maintain the correct posture. The use of auxetic structure, compared to conventional materials and structures, makes this collar more resistant, flexible, transpiring, and adaptable to the anatomy of the neck because it supports movements in different postures, like a second skin.

The same approach, using different geometry, was applied into the design of an unstable chair that helps the training of abdominal muscles like the ball-chair: The *Auxetic chair*[15] (fig. 13) is designed and created as highly dynamic seat that adapts to different anatomies and respond to principles as flexibility, extensibility and mechanical resistance of the auxetic structures.

7. Nature details. Introducing biology to designers

The changes in the design approach, and the hybrid design research and experimentation processes with other disciplines in order to face need a revision of the university teaching methods to prepare students to learn and interact with other disciplines, Design university

15 Design: Martina Panico Relatore: Carla Langella, correlatore: Carlo Santulli.

must change and renew itself in this direction. At this aim, in HDL students and researchers are introduced, even immersed, in other disciplines with the formula *designer in lab* to undergo a process of deconstruction and reconstruction approach, to make designers and researchers more flexible, adaptable, curious, open and collaborative. The HDL also developed an innovative teaching methods called “Nature Details” aimed to foster these processes.

Nature details is an educational module in which designers and biologists teach together how to learn and inspire from nature, deeply observing and admiring its ability to adapt, to self-organize, to answer to variable conditions, to generate organized form of complexity, as well as, to visualize and respect its high but limited resilience. For this purpose, students of the course “Bio-innovation” course of the Master degree in “Design for Innovation” at University of Campania “Luigi Vanvitelli” are induced to focus on details of different biological constructions through micro- and macro- scales observations. Focusing on details is a strategical choice: they are important for design, especially in *made in Italy* design, as well as in natural systems; nature details can show the precision and the complexity of biological systems subliming principles, equilibrium and processes of natural selection and evolution.

Thus, different biological constructions are submitted to student’s attentions such as flowers, leaves, sponges, insects, shell of bivalve, gastropods, cephalopods, vertebrate bones, *etc*.; then, they are analysed at different scales, from real (naked eye) to magnified scales, using a magnified glass and digital microscopes.

The didactic value of these observations are assured and enhanced by the assistance of multidisciplinary guides: a biologist, who describes the biological motivations of each observed details such as shapes, stratifications, textures, layers, porosities and hierarchies; and a designer, who illustrates and interprets the possible constructive and generative choices, as well as, different examples of their biomimetic transfers into design projects. These two different points of view allow intensive and suggestive dialogues between disciplines (Thiel *et al.*, 2015) maintaining coherent the analogies, the intuitions and the way of thinking nature.

Many projects raised from these activities and several students, fascinating by the new ways to view natural systems, decided to further approach and dialogue with scientists.

HDL promotes these dialogues with scientists also by guiding students in laboratories and scientific institutions. Students are here stimulated to works with scientist in different ways such as realizing digital bi- and tridimensional models that are useful to better understand how scientists research principles and laws in nature and especially how to transfer them in possible innovative products. As noted in previous paragraphs, for each project raised from science, also scientists benefit from translating their research into innovative design projects

and, moreover, from design modelling they can obtain scientific models usable for publication, promotion, teaching and research itself. In the diatom projects, for example, a design student realized 3D models starting from electron microscope images that physicist and biologist used for their specific mechanical, fluid dynamic and optical simulations. As consequence, these didactic activities are transformed in another successful form of mutual and bi-univocal collaborations between disciplines.

8. Conclusions

The described design experiments and approaches reveal how contemporary design has to deal with scientific and technological culture in order to adapt its products to the complexity of current living conditions. It is therefore necessary that designers and scientists share skills and tools to collaborate and develop adequate methodological approaches to evolve new systems of production more integrated with nature (Oxman, 2016).

Design must adapt to a new way of perceiving sustainability, in its quantitative and qualitative aspects. There is a contrast between quantitative impact assessment methods, that are based on measurements of the amount of matter and energy used or substances and chemical components involved (such as the Life Cycle Assessment), and the qualitative-interpretative methods that try to include the immaterial, aesthetical aspects and property that are generally used by design but not quantifiable. Nonetheless, design in collaboration with science, and in particular with biosciences, can develop new methods and indicators that are more comparable and reliable.

Moreover, a new principle of sustainable smartness inducted by nature must be added to these qualitative and quantitative evaluation systems according to an analogy between biological and production evolution. A smartness that is made up of resilience, adaptability, self-organization, as well as, empathy intended as the ability to make people to love products. Qualities that determine a greater and lesser impact both on social and environmental systems. Design must take these factors into account, and must be able to implement them in a sustainability assessment, developing specific indicators for identified biological qualities.

In function of these evolutionary scenarios, the designer must be able to manage the extension of his field of intervention with new technical-scientific skills, greater elasticity, and spirit of experimentation and prefiguration capability. Schools and universities must adapt to these training needs and aim to generate new hybrid professional figures with the right tools and skills to manage processes of disciplinary intersection, to understand new worlds induced by science and to translate them into possible innovations.

Finally, designers have a great opportunity: they can explicit the materials and production processes used in products, induce appropriate use patterns, make the intentions of the companies transparent. In the context of sustainability where there are many misunderstandings and the information are frequently camouflaged or manipulated, design can tell the truth.

Figures 1 *Diaglass*, jewels realized upcycling glass with gold dust through heating process. Design: Serena Miranda. Scientific coordination: Carla Langella.

Figures 2 *Nature Imprinting*, jewels realized upcycling volcanic stone powder, incorporated in polymer clay, obtaining the shapes from molds realized imprinting natural textures like cabbage or corals. Design: Livia Sorgente; Scientific coordination: Carla Langella.

Figures 3 *Frammenti*, jewels realized upcycling waste from a marble company (Alfa Marmi). Design is inspired by Pompeian jewellery. Design: Francesca Liguori; Scientific coordination: Carla Langella.

Figure 4 *Thumbio*, orthopaedic brace realized to be used in therapeutic immobilizations for inflammatory and degenerative diseases of hand and wrist made with functionalized biodegradable bioplastic. Design: Clarita Caliendo; coordinator: Carla Langella, developed with the collaboration of Carlo Santulli and Antonio Bove.

Figure 5 *New materials form the sea*. Design Francesco Amato, Clarita Caliendo; coordinator design: Carla Langella; coordinator material science: Mario Malinconico.

Figure 6 Photovoltaic lamp integrated with the natural sponge *Euclpetella.* Design: Simona Sbriglia, coordinator design: Carla Langella; parametric design e 3D model: Gabriele Pontillo: Biology: Valentina Perricone.

Figure 7 *Loofa Lamp*. lamp made with artificial material and cultivated matter. Design: Piera Di Martino, coordinator: Carla Langella.

Figure 7 *Hempbench,* bench made of raw hemp fiber. Design Angela Bonanno, Scientific coordination: Carla Langella.

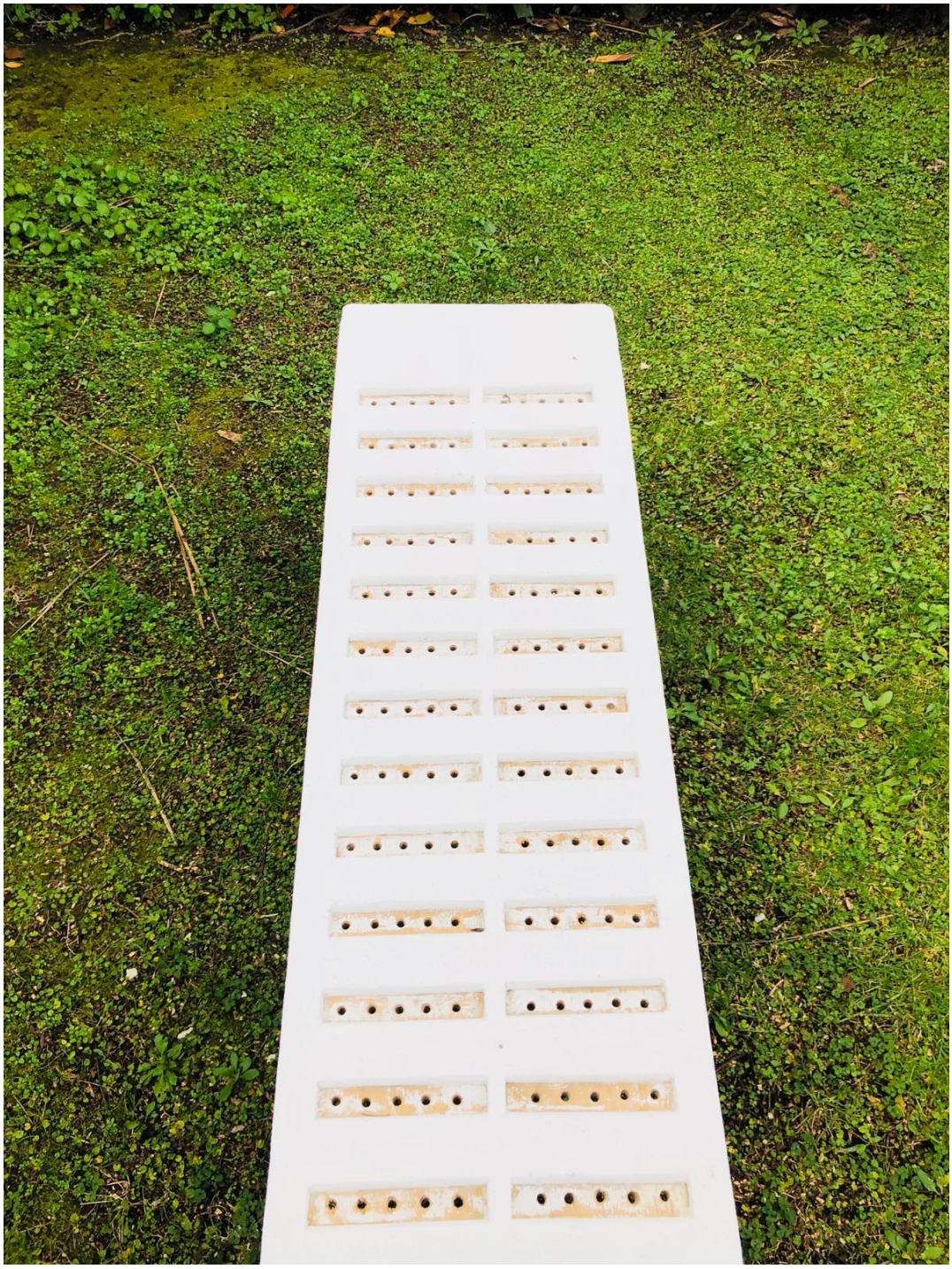

Figure 8 *Pancan,* bench made of hemp fiber and cement, inspired by the structural optimization of diatoms. Design Domenico Napolitano; Scientific coordination: Carla Langella, Biology: Valentina Perricone.

Figure 9 *Hemplamp, lamp made with raw hemp fiber and liquid ceramic, inspired by traditional spindles. Design Nicola Esposito, Laura Guarino; Scientific coordination: Carla Langella.*

Figure 10 *Aquaviva*. Design: Valentina Pianese; Scientific coordination: Carla Langella.

Figure 11 *Auxetic neckbrace*, Auxetic cervical collar. Design: Martina Panico, coordinator: Carla Langella, material science: Carlo Santulli.

Figure 12 *Auxetic chair*, dynamics session adaptable to different anatomies. Design: Martina Panico, coordinator: Carla Langella, material science: Carlo Santulli.

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Urban Transformation of a 19th Century Ottoman City: Bursa under the Impacts of Tanzimat Reforms

Sinem TÜRKOĞLU ÖNGE*

Abstract

In order to modernize and secularize its traditional institutions, the Ottoman government embarked on a western-inspired reform process –*Tanzimat*- that started in the 18th century at administrative and military areas and continued throughout the 19th century in a variety of fields. The modernization of the cities was one of the major concerns of *Tanzimat* reforms that affected the traditional spatial characteristics of Ottoman cities from the 19th century. Bursa, which had continued its importance for centuries as a religious, cultural and commercial center in Ottoman geography, became the focus of *Tanzimat*'s modernization reforms, after 1840's. The earliest impacts of these reforms were seen as industrial changes leading to new factory districts around traditional commercial center of the city. This transformation process was followed by the opening of new arteries, formation of new residential quarters and the emergence of new building types around this center that altered the traditional urban fabric of Bursa in the second half of the 19th century. Within this context, this paper aims to reveal the spatial continuities and transformations in the 19th century urban fabric of Bursa by means of comparing the spatial elements and urban relations before and after the implementations of *Tanzimat* reforms.

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19. Yüzyılda Bir Osmanlı Şehrinin Kentsel Dönüşümü: Tanzimat Reformları Etkisinde Bursa

Sinem Türkoğlu ÖNGE*

Anahtar kelimeler:

Bursa, 19.yüzyıl, Tanzimat Reformları, Kentsel Dönüşüm

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Osmanlı İmparatorluğu, geleneksel kurumlarını modernize ve sekülerize etmek amacıyla 18. yüzyıldan itibaren Tanzimat adı verilen bir reform sürecine girmiş; en erken yönetsel ve askeri alanlarda uygulanmaya başlayan ve bu reform süreci, 19. Yüzyıl boyunca çok farklı alanlarda etkisini göstermiştir. Bu dönemde, kentlerin modernizasyonu konusu da Tanzimat reformlarının ana sorunsallarından birisi olmuş; batı kökenli kent kurumları, kanunlar ve planlama prensipleri ile Osmanlı kentlerinin geleneksel mekân yapısını 19. yüzyıldan itibaren etkilemeye başlamıştır. Osmanlı coğrafyasında yüzyıllar boyunca dini, kültürel ve ticari bir merkez olarak önemini koruyan, İmparatorluğun ilk başkenti Bursa, 1840'lardan itibaren Tanzimat reformlarının odağı haline gelmiştir. Bu reformların Bursa'ya ilk etkileri, endüstri alanında gerçekleşmiş, kentin geleneksel ticaret merkezinin çeperinde yeni fabrika bölgeleri belirmiştir. Kentin geleneksel dokusu, yeni caddelerin açılması, yeni yerleşim bölgelerinin kurulması ve yeni yapı türlerinin ortaya çıkışıyla, 19. yüzyılın ikinci yarısında değişmiştir. Bu makale, 19. yüzyıl Bursa'sının kentsel mekanındaki mekânsal süreklilikleri ve dönüşümleri, Tanzimat reformları öncesindeki ve sonrasındaki kentsel ögelere ve ilişkilere odaklanarak ortaya koymayı amaçlamaktadır

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1. Introduction

The gradually increasing European power from the 17th century pushed Ottoman Empire into a "westernization" process in order to regain its power by re-organizing and modernizing its traditional institutions along western tendencies. This was a reform process that started from the 18th century and continued throughout the 19th century at variety of levels. This reform period accelerated after the proclamation of *Tanzimat* Charter in 1839, from which, the architectural and urban characteristics of Ottoman cities began to change, progressively. The primarily impacts of *Tanzimat* reforms were seen in the capital, and then in other cities of the Empire.

Bursa, as the first capital of the Ottoman State continued to keep the Ottoman imperial glory for centuries not only as a religious, but also as an important cultural and commercial center. In the early 19th century, Bursa was also retaining the urban features of the previous centuries. Being dominated by a lively commercial area, which can be identified as the physical center of the city, Bursa was a traditional Ottoman city characterized by its citadel, Great Mosque and organically developed residential areas around them. However, the demolition of the city by an earthquake in 1855 that resulted in the need for an extensive reconstruction made Bursa the focus of *Tanzimat*'s modernization reforms. The initial impacts of these reforms on Bursa were seen on industry where new factory quarters appeared around the traditional commercial center of the city. From the second half of the 19th century, the physical structure of Bursa and the urban practices in the city began to change as a result of the opening of new arteries, formation of new residential quarters and the emergence of new building types, affiliated to the new institutions of *Tanzimat*.

Within this context, this paper aims to reveal the spatial continuities and transformations in the 19th century urban fabric of Bursa by means of comparing the spatial elements and urban relations before and after the implementations of *Tanzimat* reforms. At this point, the early maps of Bursa, particularly 1862 Suphi Bey Map, 1907 and 1922 Maps, early photographs of the city and other archival documents make this comparative evaluation possible. The method that is proposed to carry out this study is to examine the urban evolution of the city by means of morphological analysis. This analysis will be held in the reorganization of the road network, the emergence of new architectural formations, and as well as the formation and transformation of residential quarters in the urban layout of Bursa, through different time periods. Within this scope, the political, social, cultural and economic dynamics of the era and their impacts on the urban morphology will be examined as part of this methodological approach.

2. The Evolution of the Urban Fabric of Bursa until the mid-19th Century

Bursa (*Prusa*), the main settlement of which was inside the citadel area, had been the capital of antique *Bithyinian* Kingdom until it became a provincial center of Roman Empire around 1st

century BC and then of Byzantines in the 4th century AC. During these ages, *Prusa*, with other antique cities of Bithynia such as *Nicaea* (İznik), *Nicomedia* (İzmit), *Apameia* (Mudanya), *Aniocheia* (Yalova) and *Cius* (Gemlik), became crucial nodes on Anatolian trade routes and, therefore, played an important role on the development of urban life in the northwestern Anatolia (Tanyeli, 1984, p29).

Following its conquest in 1299, Bursa became the first capital of the Ottoman State in 1326 and extended immediately beyond antique citadel walls. This urban expansion was dominated by three spatial elements, that were the citadel, the market area and the religious complexes (Erder, 1976, p.206). It was the 14th and 15th century evolution of its physical structure that determined the urban character of Bursa until the 19th century.

After the erection of Orhan Bey Mosque inside the citadel, Bey *Hanı*, which constituted the nucleus of traditional market area of Bursa, appeared as the oldest commercial building outside the citadel walls (Baykal, 1950, pp.26-27; Köprülü Bağbancı, 2007, pp. 44-46). From the end of the 14th century, the construction of the Grand Mosque and four main sultan complexes –which were Hüdavendigar, Yıldırım, Yeşil and Muradiye- dominated the urban expansion of Bursa (Figure 1). From the 15th century, besides these royal complexes, many smaller religious buildings were erected in Bursa, where residential districts –*mahalles*- began to be formed around these religious complexes in an organic pattern.

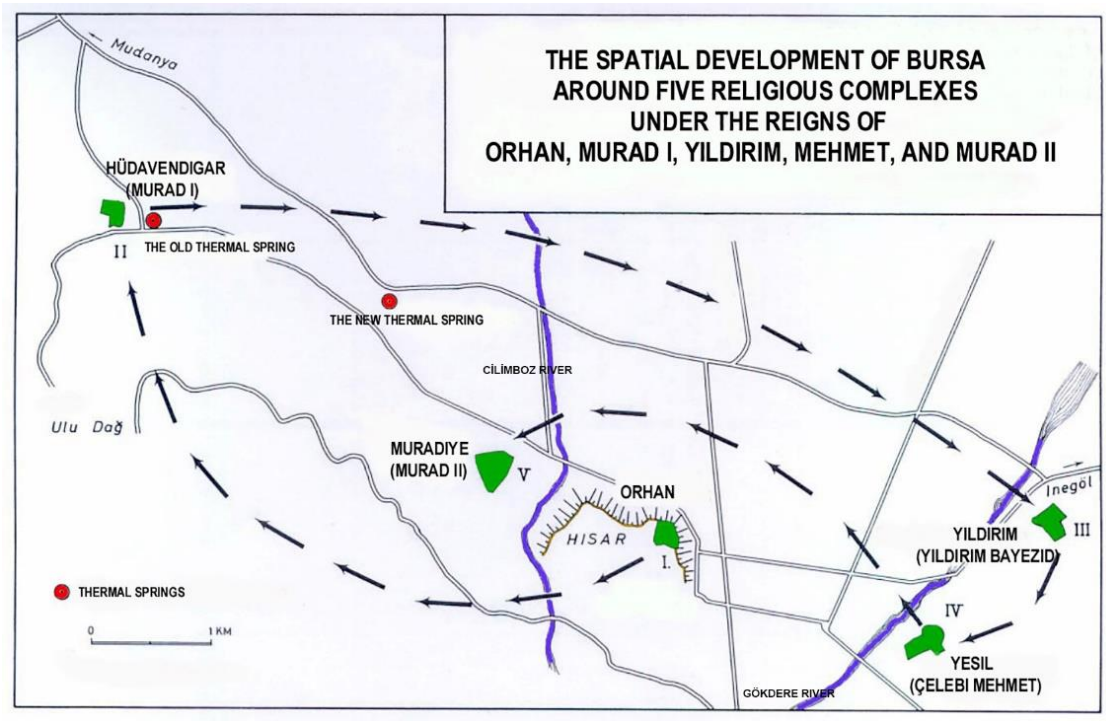

Figure 1 – Schematic Drawing of the 14 th and 15th Centuries Spatial Expansion of Bursa around Religious Complexes (Türkoğlu, 2002)

The erection of the Great Mosque and *Bedesten* can be seen the earliest intentions to form a spatial center in the urban fabric of Bursa. From the 15th century, the region around the oldest Bey Hanı, Grand Mosque and *Bedesten* began to be filled with numerous *han* buildings, shops, closed and open markets and other public amenities, which resulted in the emergence of an attractive focal area both for city dwellers and for those visiting the city for trading purposes. Similar to those in other Ottoman cities, the commercial center of Bursa preserved its importance not only as an economic center, but also as a center of religious and social practices for centuries, although it had almost completed its urban expansion around the second half of the 16th century (Figure 2) (Baykal, 1950, pp. 137-141; Yenal, 1996, pp. 27-29).

Figure 2 – General view of Bursa before 19th century (Engraving of A. Slom)

(Reclus, 1884, p.586)

2.1. *Suphi Bey* Map and Bursa in the first half of the 19th Century

Bursa, in the first half of the 19th century, still retained the urban features of 16th century, which was revealed in an important visual source, called *Suphi Bey* Map. In 1862, a group of engineers of the Ottoman General Staff (*Erkân-ı Harbiye*) headed by Suphi Bey prepared the first detailed map of Bursa. *Suphi Bey* Map, which was prepared at approximately 1/1600 scale, seems like a modern photogrammetric drawing, where the streets, buildings, gardens and other urban elements were rendered precisely. The Map was prepared to determine the state of the city, following the devastating earthquake in 1855, before its reconstruction and informs the urban organization of the city in the initial phase of the Tanzimat reforms, in the first half of the century.

As seen on Suphi Bey Map, the urban layout of Bursa in the first half of the 19th century dominated by the citadel, the commercial center area around the Great Mosque and by the residential quarters around main religious complexes and small religious units around the city. Clustering around the commercial center, the city expanded four kilometers on the east-west axis and one and a-half kilometers on the north-south axis. Two major rivers, Cilimboz and Gökdere flowing from south to north, geographically divided the city into three parts. Two smaller streams, Namazgâh and Karınca, divided the southeastern parts of the city.

The residential areas of Bursa in the early 19th century were formed by organically developed neighborhoods (*mahalle*) that retained the characteristics of the traditional Ottoman *mahalle* concept with its irregular, dead-ended narrow streets, houses with gardens and with religious and social units. The sources give the number of the *mahalle*s in the mid of the 19th century as 173 (Kaplanoğlu, 1989, p.10; Köseoğlu, 1946). The *mahalle*s inside the citadel area, those around major religious complexes and those located at the north and the south of the commercial center were important Muslim quarters of Bursa (Figure 3). On the other hand, the non-Muslim quarters, many of which had been settled since 15th and 16th centuries, were distinct from the Muslim quarters. The non-Muslim *mahalle*s of Bursa were located on the southern parts of the Gökdere and Cilimboz rivers, around Setbaşı (Christian Quarters) and on the north of the citadel area (Jewish Quarter) (Köseoğlu, 1946).

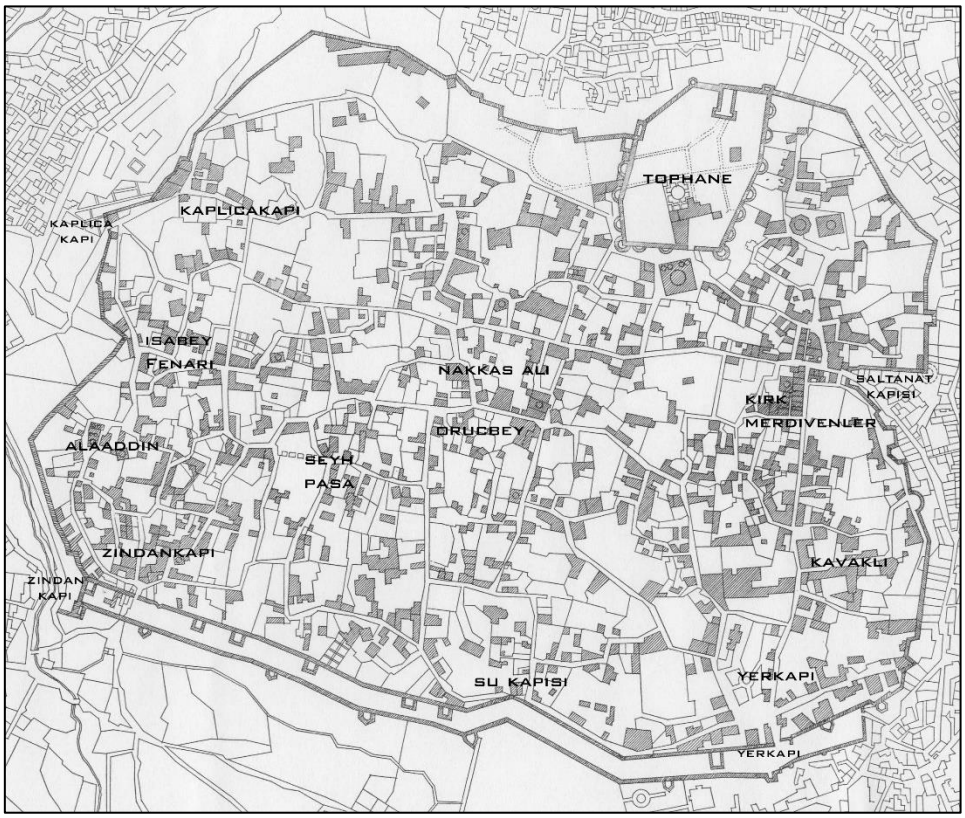

Figure 3 – The Muslim Citadel Quarters on *Suphi Bey* Map (redrawn by the author)

The streets, which were oriented to religious buildings inside the residential quarters, connected to the main road network of the city that led an orientation towards the commercial center. Saray Street was the major artery of the early 19th century Bursa that wounds its way irregularly from the east of the citadel, pass the Great Mosque and the commercial center towards the Setbaşı Bridge to the east and continued as Namazgâh Street to the southeast of the city. Saray Street continued as Muradiye Street by passing Altıparmak and Jewish quarters till Muradiye and Çekirge on the west of the city. The roads leading from the market area to the northern parts of the city were noted on the Map as Reyhan, Tayakadın and Elmalık Streets, where Alacahırka, Pınarbaşı, Eşrefiler and Molla Arap Streets were passing through the southern slopes of the city. Besides more than 40 main arteries, the narrower roads diverging from these main roads led to the various quarters and significant buildings of the city organically were completing the street network of Bursa around 1860's.

On Suphi Bey Map, the Muslim and non-Muslim religious buildings of Bursa were identified with their names in detail. Besides great religious complexes, there existed approximately 120 mosques and masjids, 4 Christian churches, 3 synagogues, several tombs and *tekke*s and cemeteries in different parts of the city in the mid of 19th century. Moreover, many non-Muslim and Muslim schools (medrese), thermal springs, baths, public fountains, promenades and bridges on the rivers of Bursa were drawn and noted on Suphi Bey Map (Figure 4).

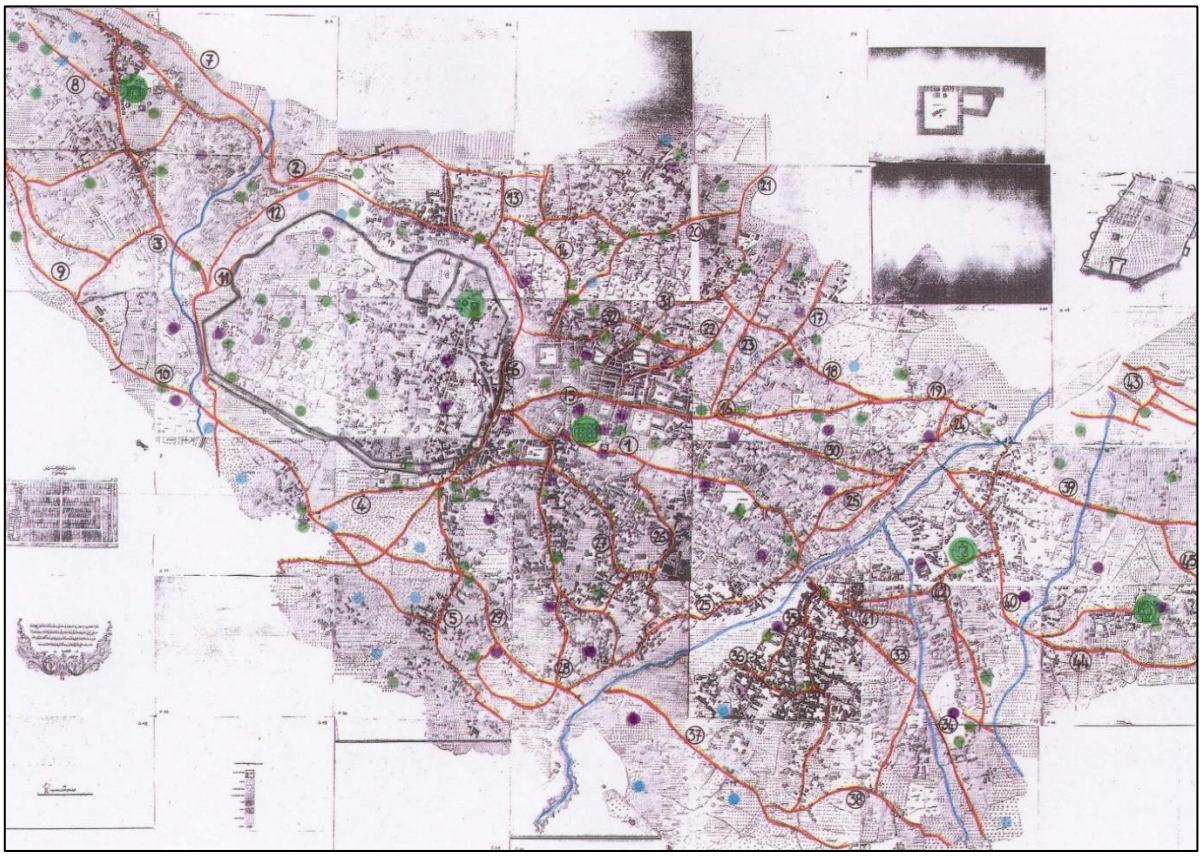

Figure 4 – 1862 Suphi Bey Map (street network, religious buildings (green dots), cemeteries (blue dots) and other social buildings (purple dots) were redrawn by the author)

Judging from the 1862 Suphi Bey Map, the commercial center (market area) of Bursa seems also to have remained within its 16th century limits. This area with numerous commercial, religious and social buildings – such as a Bedesten and *han* buildings affiliated with many mosques, schools (*medrese*), dervish hospices (*tekke*), soup kitchens (*imaret*), public baths and coffeehouses- dominated not only the land use in this part of the city but also was the heart of the social life (St.Laurent, 1989). *Bedesten*, which was surrounded by numerous *han*'s, was the greatest of the commercial buildings, where the traders were met in Bursa. Since the economy of Bursa had been based on sericulture and silk weaving from the end of the 14th century, Bursa Bedesten and many of these *han*s were specialized for storing and marketing silk products, as well as the craft products, cultivated products or raw products. *Emir Hanı, Koza Han, Kapan Hanı, Zeytin Han, Pirinç Han, Geyve Han, Fidan Han, Sandıkçılar Han, Arabacılar Han* were some of the names of important Han buildings in the 19th century Bursa. In addition, the production and marketing of different vital needs of the community also resulted in a spatial differentiation in the market area that resulted in the emergence of several semi-closed and open bazaars (*çarşı*) such as shoe market (*haffaflar çarşısı*), jewelers' market (*kuyumcular çarşısı*), silk manufacturers market (*kazazlar çarşısı*) or tailors' market (*terziler çarşısı*). Here, besides the foodstuffs, diverse types of products were produced and sold by craftsmen and artisans. Although the commercial buildings in the city center of Bursa concentrated around Bedesten and Great Mosque, the bazaars extended towards Setbaşı and Irgandı Bridges on Gökdere, by means of passing Uzun Çarşı and Kayan Streets (Figure 5) (Köprülü Bağbancı, 2007, pp.111-113).

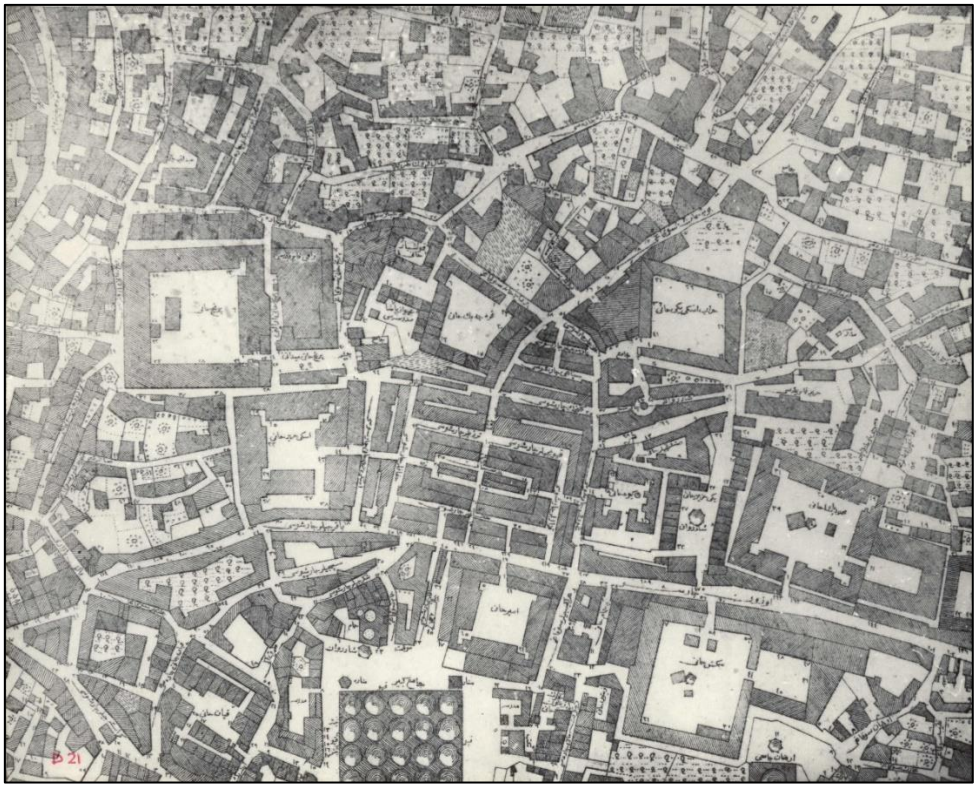

Figure 5 – The commercial center of Bursa on Suphi Bey Map (Source: Authors' Archive)

Though the commercial activities took place orderly in the city center, the manufacturing activities were monopolized in the distinct parts of the early 19th century Bursa. One of these areas extended from the western slopes of the citadel to the south along the Cilimboz River. The second was on the left and right banks of the Gökdere River where sericulture and weaving activities were carried on small ateliers. In the first half of the 19th century, small workshops began to appear on the northern edges of the city (Erder, 1976, p.222).

3. The Period of Tanzimat Reforms and their Impacts on the Urban Fabric of Bursa

The Ottoman Empire was introduced to a new concept, *westernization*, during the last two centuries of its history[1]. From the end of the 17th century, increasing political problems, deteriorating economic activities and continuous military losses rose up the relations between western countries and the Ottoman Empire. The efforts to become competitive with Europe pushed the Empire into a reform process that started in the 18th century primarily at the administrative and military levels and continued throughout the 19th century in a variety of domains like political, social, economic, educational and urban. Following the proclamation of the *Tanzimat* Charter in 1839, the Ottoman Empire embarked on a series of reform movements to regain its power by modernizing and secularizing its traditional institutions along western thoughts and tendencies. The institutional reforms implemented from the 18th century to the early 20th century also altered the traditional urban institutions of the Ottoman Empire.

In this context, the urban reforms of *Tanzimat* that transformed the traditional institutions can be related to two reasons. One is that for the Ottoman government, the target of these reforms was struggling against the western superiority by using their ideas, techniques and cultural values and thus, modernizing the Ottoman society. The urban projection of this target was the imitation of a western city model that were seen by the *Tanzimat* reformers as the symbol of modernity. The other was an internal reason that was the efforts of the Ottoman government to establish –or regain- its authority in cities. This is because the reason of the lack of order in the urban life before the *Tanzimat* period was seen by the society as not only the lack of interest, but also the lack of the discernment of the previous governments (Yerasimos, 1999, pp. 2-8).

In the traditional Ottoman urban administration, the administrative, judicial and municipal works were at the hands of the *kadı*s. Following the declaration of the *Tanzimat* Charter, which aimed a centralized hierarchy by means of codification and systematization of the traditional institutions, the duties of *kadı*s in the cities were transferred to newly established institutions, which firstly appeared in the capital, İstanbul, and then in other cities of the Empire (Ortaylı, 1974, pp. 108-109). Instead of the traditional one, a new *Şehremaneti* was founded similar to French models, in 1855, and its responsibilities were formulated as the construction and repair

[1] Here, the word *westernization* refers to the efforts of the Ottoman Empire to modernize its traditional institutions along western thoughts and tendencies.

of the roads, cleaning and embellishment of the city, controlling the collection of the taxes and providing the basic needs of the capital. In the same year, the Commission for the Order of the City was formed to prepare a municipal model and a more fundamental urban program for Istanbul, where the Sixth District Administration was founded subsequently (Ergin, 1922, pp.1374-1380). The foundation of the Municipality in the capital also encouraged the municipal organizations in other Anatolian cities, particularly in the port cities and in the cities having dense trade activities. In 1867, the Ottoman government had declared two new regulations on the organization schemes and the duties of the municipalities in the cities. Bursa Municipality was founded in the same year along these regulations (Dostoğlu and Oral, 1999, p. 235).

Fires destroying the traditional character of the Ottoman cities were urgent problems in front of *Tanzimat*'s urban reform program. Between 1848 and 1882, there passed six major regulations, which concentrated on the planning of the conflagration areas, on street and building standards and on the repair and construction standards of the buildings and roads and the land-surveying methods. 1848 Building Regulation was the earliest of these regulations, in accordance to which the cul-de-sacs were forbidden and straight streets were proposed concerning the fire danger. 1848 Regulation was followed by 1849 and 1864 Street and Building Regulations and 1875 Regulation on the Construction Methods in Istanbul. The 1877 Municipal Law, regulating the foundations and the duties of the municipal organizations, was a crucial step within *Tanzimat*'s institutional reform period. The 1882 Building Law concentrated on the street and building standards, planning principles of the conflagration areas in grid pattern, the repair and construction standards of the buildings and roads, the land-surveying methods. However, the application of 1882 law should be thought together with another law that was 1873 Expropriation Law, since the new quarters on the conflagration areas and the new, immigrant quarters were formed according to these laws (Denel, 1982; Dostoğlu and Oral, 1999, p. 235; Tekeli, 1985, p. 167).

As a result of the foundation of new institutions and acceptance of new regulations, the urban structures and architectural characteristics of the most of Ottoman cities, as well as of Bursa, began to change from the second half of the 19th century.

3.1. First Impacts: Changes in Industry and New Factory Districts

Bursa had an unrivalled place in the Empire for the production and trade of silk for centuries. On the other hand, as being an important sericulture center, Bursa did not have a factory production in terms of an organized and mechanized system, where the production activities were operated in separate and personal looms in different part of the city, until the 19th century (Erder, 1976, pp.98-99).

As a result of developing industrial technology and the mechanized manufacture in Europe, a mechanization process in Bursa started after 1840's by means of transferring new industrial institutions and technologies from Europe. Following the emergence of steam-powered

engines, which needed proximity of water sources for boiling and waste disposal, the silk factories began to be seen particularly near the streams of Bursa. Following the opening of the first silk factory by Taşçıyan-Falkeisen Partnership in 1846 and then the opening of Imperial Silk Factory (*Fabrika-i Hümayun*) in 1852, the number of silk factories reached to 90 in 1870's (Figure 6) (Erder, 1975, p.91). Following the opening of the Institute of Sericulture (*Harir Darü't Talimi*) in 1888, many qualified workers of sericulture were trained until first quarter of 20th century (Figure 7) (Yıldırım, 2013, pp. 579-581).

As it was analyzed from Suphi Bey Map, Bursa had three main factory districts around 1860's. One of these extended from the western slopes of the citadel towards the left and right banks of the Cilimboz River, near the Greek Quarter. The other was located on the southeastern parts of the city, between Gökdere and Namazgah Streams, the area of which was predominantly inhabited by Armenians. The third district was formed by occasionally scattered factories on the northern parts of the city.

Figure 6 – Factory District around Cilimboz River (Alfred de Moustier,1862)

3.2. Re-organization of the Urban Structure: New Arteries

In the following years of the great earthquake in 1855, the reform government embarked on a large-scale reconstruction program for restoring Bursa. In this period, the assignment of Ahmet Vefik Paşa as the governor was a breaking point for the city. Following his ambassadorial experience in Paris, where he observed the planning and reconstruction activities of the city under Baron Haussmann, Ahmet Vefik Paşa was appointed to Bursa in

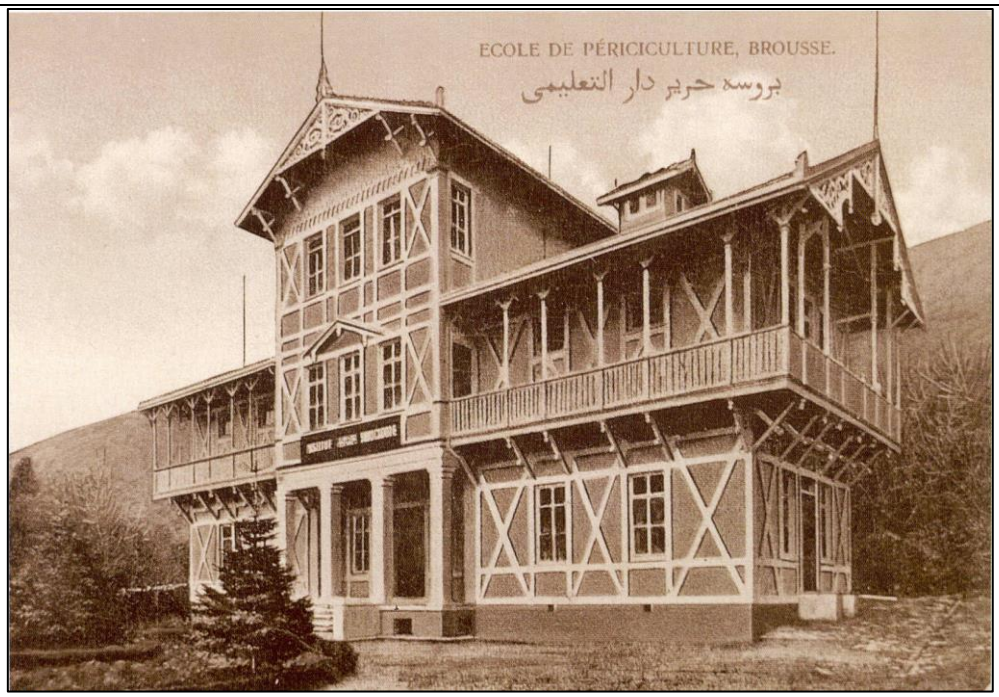

Figure 7 – Institute of Sericulture (Özendes, 1999)

1863. During his two tours of duty in Bursa, Ahmet Vefik Paşa, and his following governors, gave vital importance to the supervision of the roads, both at inter-urban level and in the city, as well as to the planning and construction of new neighborhoods and organization of new institutions (St.Laurent, 1989, pp. 50-53).

The road construction program of Ahmet Vefik Paşa that preceded the latter developments in the second half of the 19th century included widening and straightening the major arteries of the city and eliminating the cul-de-sacs impeding the traffic. Linking the major monuments of the city with wide straight arteries, much like Haussmann's boulevards in Paris, to the new institutions and building new roads leading to old ones were part of this program. On the other hand, the major conflagrations eased the path of this program where the traditional irregular street networks of the neighborhoods in conflagration areas were replaced with orthogonal planned grids.

At the inter-urban level, the connection of Bursa and its ports on the Marmara Sea was improved to ease the transportation. The major artery, Saray Street, extending from the citadel to Setbaşı Bridge was widened, straightened and its name was changed to Hükümet Street. In later years, Hükümet Street was extended to the north of the citadel, and then, to Çekirge in the west. A new artery, Gemlik Street, was opened to connect the commercial center to the north of the city. The street of Mecidiye, the construction of which began in the reign of Ahmet Vefik Paşa, was opened in 1904 and connected Hükümet and Mahmudiye Streets. In the following years, Mecidiye Street extended till Maksem that formed a vital artery connecting northern and southern borders of the city to the commercial center. Hamidiye Street, lying in the east-west direction perpendicular to Mecidiye Street, was also opened in

this period. Crossing the Mecidiye and Gemlik streets, Hamidiye Street connected the northern and southern neighborhoods to the east and west. The opening of the railway at the end of the 19th century was also an important breaking point for Bursa. The opening of the Bursa-Mudanya Railway in 1892 prompted the construction of three railway stations along the railway line, on the north of the city. The connection of these stations by new arteries to the city center changed the transportation practices and affected the commercial activities, too (Figure 8-Figure 9) (Baykal, 1950, pp. 24-25; St.Laurent, 1989, pp. 124-126).

On the other hand, widening of existing roads or opening new arteries affected the built environment of the city, as well as of the traditional commercial center, where several old buildings were completely, or partially, demolished and many new types of buildings began to appear on and around these arteries as new physical and social focal points (Baykal, 1976, p.58; Dostoğlu and Oral, 1999, p.237).

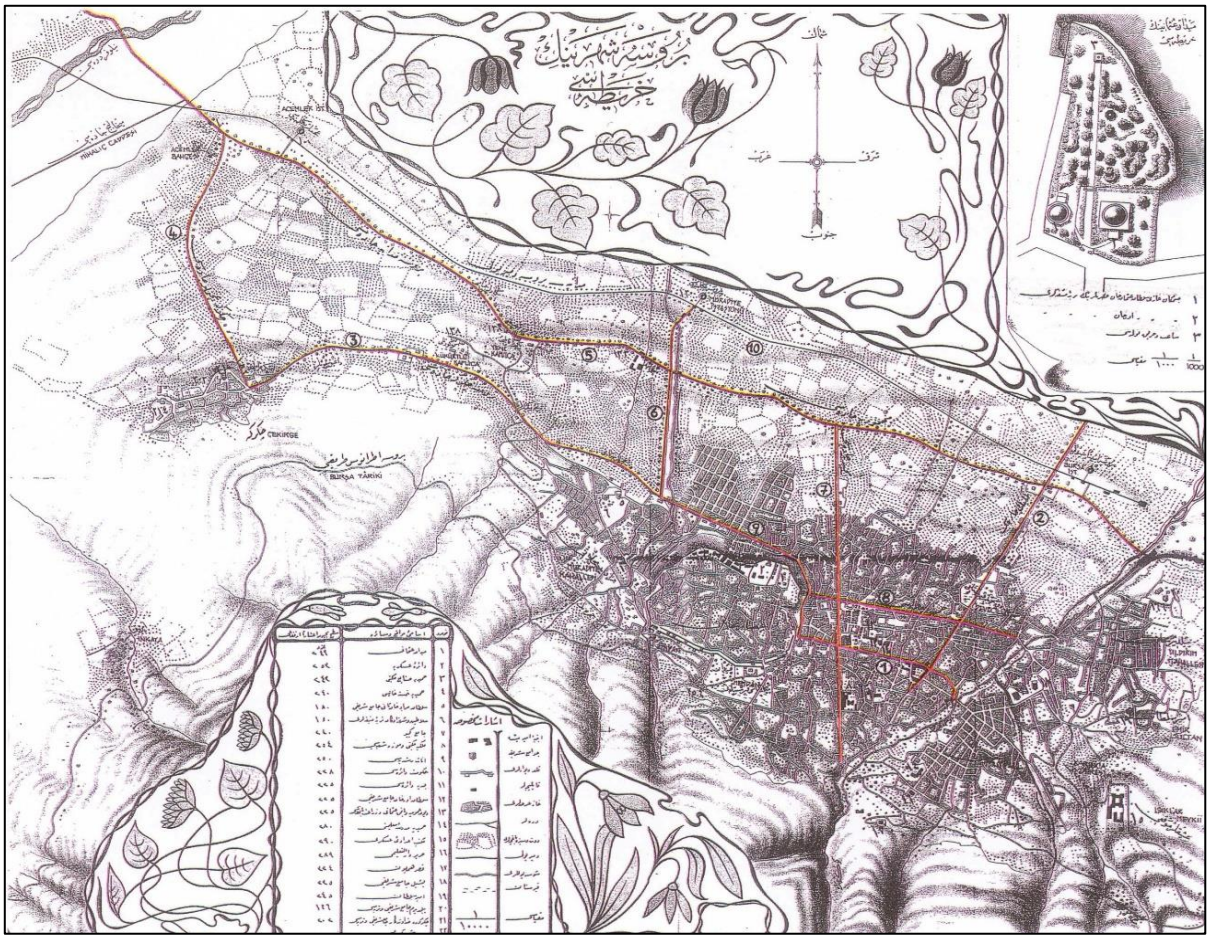

Figure 8 – New Arteries of Bursa on 1907 Map (redrawn by the author)[2]

[2] Hükümet Street (1), Gemlik Street (2), Çekirge Street (3), Acemler Street (4), Mahmudiye Street (5), Muradiye Station Street (6), Mecidiye Street (7), Hamidiye Street (8), Altıparmak Street (9), Bursa-Mudanya Railroad (10).

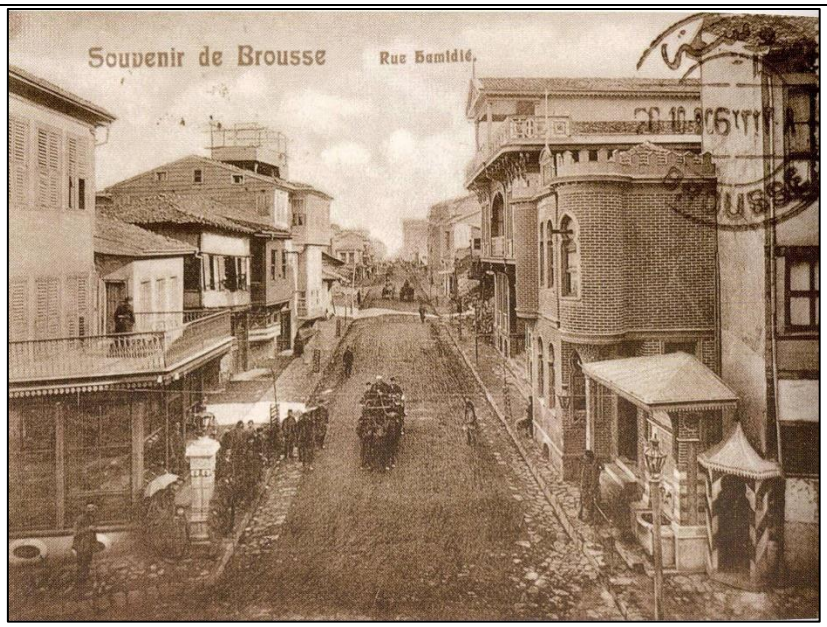

Figure 9 – Hamidiye Street (Özendes 1999)

3.3. New Building Types in the City

In the second half of the 19th century, the monumental architectural tradition of the Empire hitherto focused on religious buildings gradually began to turn towards a new, secular monumental architecture, the sources of which were found in the western cultures. Besides the practical function of constructing new building types as a result of the newly established secular institutions, the usage of western models with the Ottoman concepts had also a symbolic function of giving a modern imperial image to the outer world.

At that period, the reorganization of administrative services by the Tanzimat government led to the construction of new administration buildings in many Ottoman cities, as well as in Bursa. In honor of the visit of Sultan Abdülmecit to Bursa, within the image of sultanate to fit the modernized administration image of *Tanzimat*, a royal pavilion was built on the hill above the Armenian Quarter, in 1844. In the following years, this pavilion was connected to the commercial center by way of Hükümet Street via İpekçilik Street. In 1863, a new government house was constructed in the eastern part of the citadel, next to the market area, as the administrative and judicial center of the Hüdâvendigâr province (Figure 10) (St,Laurent, 1989, p.92,111). Following the foundation of the municipal organization in Bursa, a Municipality Building was constructed to house the *Tanzimat*'s new municipality government in 1879. The site of the building was at the city center, next to the Orhan Mosque, between the Great Mosque and government house.

The reform program of Tanzimat in the second half of the 19th century brought an expanded educational program throughout the Empire, which resulted in the emergence of new school buildings in Bursa. The Industrial School, the Art Institute, the Agricultural School, the Civil

Preparatory School, Işıklar Military School, the Sericulture Institute and the Teacher Training Schools were important education institutions that affected Bursa's social and economic life from the second half of the 19th century. Most of these schools were built on the main new streets of the city; so, they were easily accessible and connected to the city center via these arteries (St.Laurent, 1989, pp. 154-157; Bursa Ansiklopedisi, 1984, pp. 106-109).

As a part of the government's reform program, many social and cultural institutions began to appear in the cityscape from 1850's. Two modern hospital buildings in the northwest of the citadel and a theater building on the site across the government house in the city center, all of which were built in the period of Ahmet Vefik Paşa, emerged as prominent secular monuments of Bursa in the second half of the century. The theater building, which had a neoclassical decorative vocabulary derived from the western models, functioned for a short time and burned down in 1879 (St.Laurent, 1989, p.113). From the late 19th century, in parallel to the changes of the social life and to the increasing economic and touristic activities, many hotel buildings emerged in Bursa, most of which were located near the hot water springs on the western parts of the city or on the main routes, orienting towards the commercial center. Hotel Splendid and Hotel d'Anatolie were two important hotel buildings of Bursa that hosted the visitors, particularly the foreign merchants, for decades (Figure 11) (Yenal, 1996, p.37). Following the economic developments, there also appeared bank buildings -such as Ottoman Bank, Agricultural Bank and Public Debt Office- in and around city's commercial center, after 1890's (Erder, 1976, p. 237).

Figure 10 – New Government House of Bursa (Özendes, 1999)

Figure 11 – Hotel Splendide (Özendes, 1999)

3.4. Interventions on the Residential Urban Fabric

In the second half of the 19th century, a special importance was given to the planning and construction of new neighborhoods and re-planning of the traditional ones along western-based urban planning principles. In contrast to the organic and spontaneous formation of Ottoman cities for centuries, the reforms of *Tanzimat* proposed a more planned urban evolution in that period. The conflagrations affecting the old neighborhoods made them the focus of the *Tanzimat*'s urban projects, where the reform government intended to rebuild these neighborhoods as square or rectangular urban blocks without concerning their traditional characteristics. The imposition of the orthogonal planning methods in Istanbul around 1860's began to be implemented to the conflagration areas in many of the Ottoman cities around the same years (Çelik, 1986, p.88). Following the settlement needs of the immigrants after 1880's, these methods were also used while planning new neighborhoods (Aktüre, 1978; Önge, 2011).

In the following, two of Bursa neighborhoods, one of which was a re-planned one after fire and the other was a newly-established one under the impacts of *Tanzimat* reforms in the second half of the 19th century, are taken as case studies within the context of this study.

3.4.1. The Case of Setbaşı Quarter

In the case Bursa, the re-planning of the Armenian quarter of Setbaşı was one of the earliest examples among these neighborhoods. Setbaşı was amongst the neighborhoods where the Armenian inhabitants had been settled for centuries in Bursa. As it is seen on Suphi Bey Map,

Setbaşı, prior to the mid-19th century, was a dense quarter with adjacent houses that were aligning along the irregular streets and had small courts or gardens at their backyards. There were many ateliers and small-scale silk factories in this region, because sericulture activities in Bursa had been mostly in the hands of Armenians for centuries.

After its severe destruction due to the 1855 earthquake and following conflagration in 1863, Setbaşı became the focus of *Tanzimat*'s architectural and urban planning reforms. Following the assignment of Ahmet Vefik Paşa just after 1863 Setbaşı fire, the region began to re-plan according to the rules of new 1864 Street and Building Regulation. Although the previous (1848 and 1849) regulations had been effective on straightening of the roads and eliminating the cul-de-sacs, re-planning of the fire-damaged areas in the form of a grid-iron plan was firstly defined in the 1864 regulation (Denel, 1982, App.4.4.). The re-planning of Setbaşı started with the opening of a straight avenue, İpekçilik Street, which connected the Sultan's Pavilion on the north of the quarter to the market area. İpekçilik Street became a prestigious axis in Bursa after 1860's and affected the development of Setbaşı as a fashionable place in the following years (Figure 12) (St, Laurent, 1989, p.107). The orthogonal planned grids were superimposed over its old irregular street network, on which large and imposing houses were replaced those that had burned in the fire. Towards the end of the 19th century, Armenian Setbaşı completed its transformation into a western-inspired *mahalle* in Ottoman Bursa (Figure 13).

Figure 12 – İpekçilik Street 1894 (Özendes, 1999)

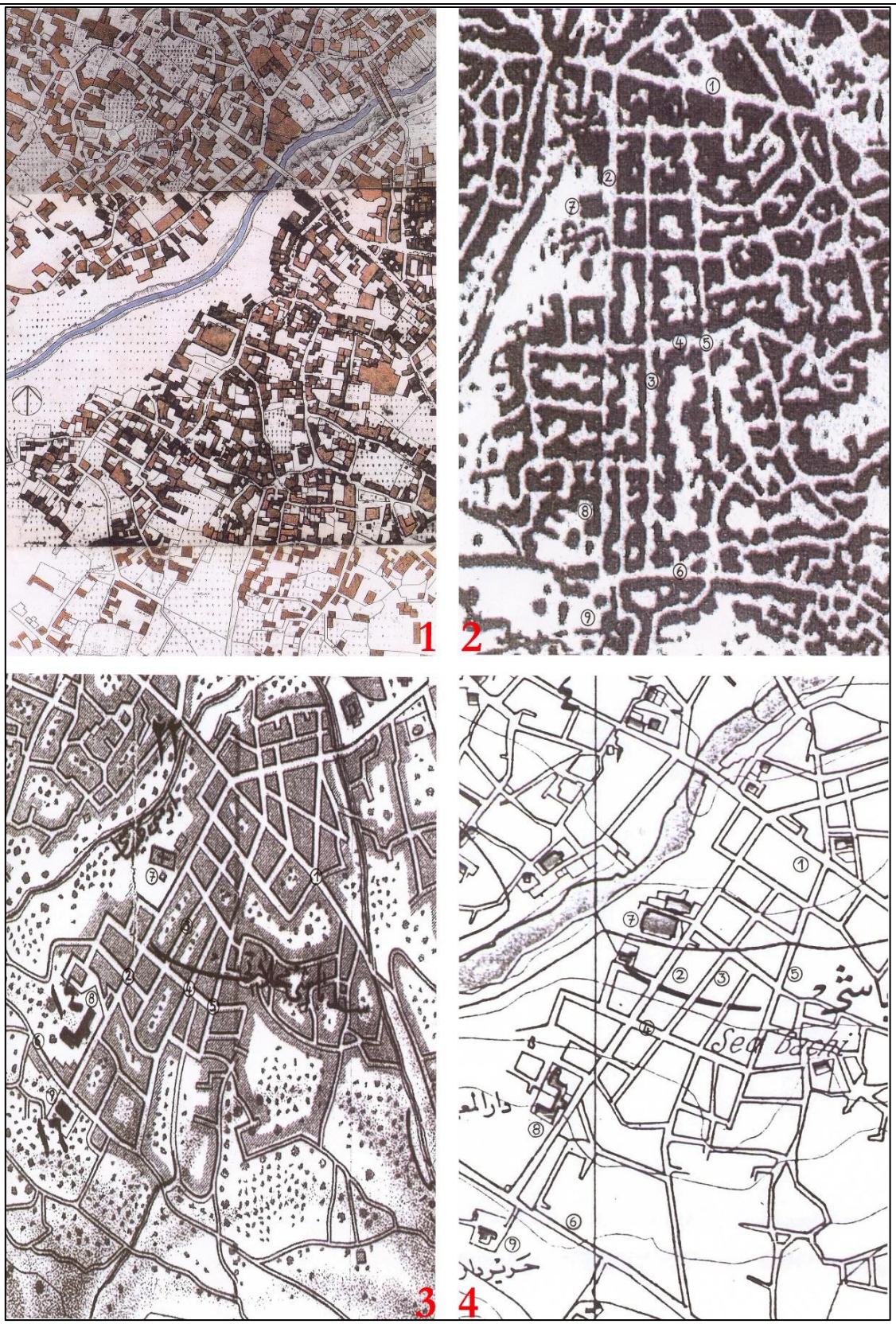

Figure 13 - Spatial Transformation of Setbaşı Quarter
1862 Suphi Bey Map (1) in comparison with 1895 Map (2), 1907 Map (3) and 1922 Map (4)
(prepared by the author)

3.4.2. The Case of Altıparmak Quarter

From the end of the 1870's to the early 20th century, the migrating refugees from Rumelia and Caucasia to Ottoman lands changed the demographic, as well as spatial character of Ottoman cities (Erder, 1976, p.161). The resettlement problem of these immigrants forced the Ottoman government to establish new neighborhoods along urban planning reforms of *Tanzimat*.

Its location near the capital and its importance as a commercial and industrial center made Bursa an ideal spot for the immigrants, particularly those from Bulgaria, Romania and Caucasia. The growth of Bursa in the last two decades of the 19th century resulted from these non-Turkish speaking Muslim immigrants who were housed in new neighborhoods established after 1878, from the governorship of Ahmet Vefik Paşa.

In 1878, the reform government was intended to build a new neighborhood on the uninhabited vast plain on the north of the citadel, Çatalfırın and Jewish Quarters, for Bulgarian immigrants. This place was rendered on Suphi Bey Map as a green plot (*hadika*), that was limited by two narrow streets on the south (Muradiye Street) and east. After selection of this by Ahmet Vefik Paşa as the site of the new immigrant quarter, this area was planned, in accordance with *Tanzimat*'s 1864, 1873, 1877 and 1882 Laws, as orthogonal grids, where the houses were built inside the rectangular plots of these grids (Denel, 1982, App.4.4.). This newly established neighborhood was connected to the city center and to Çekirge by widened Altıparmak Street (Figure 14 - Figure 15).

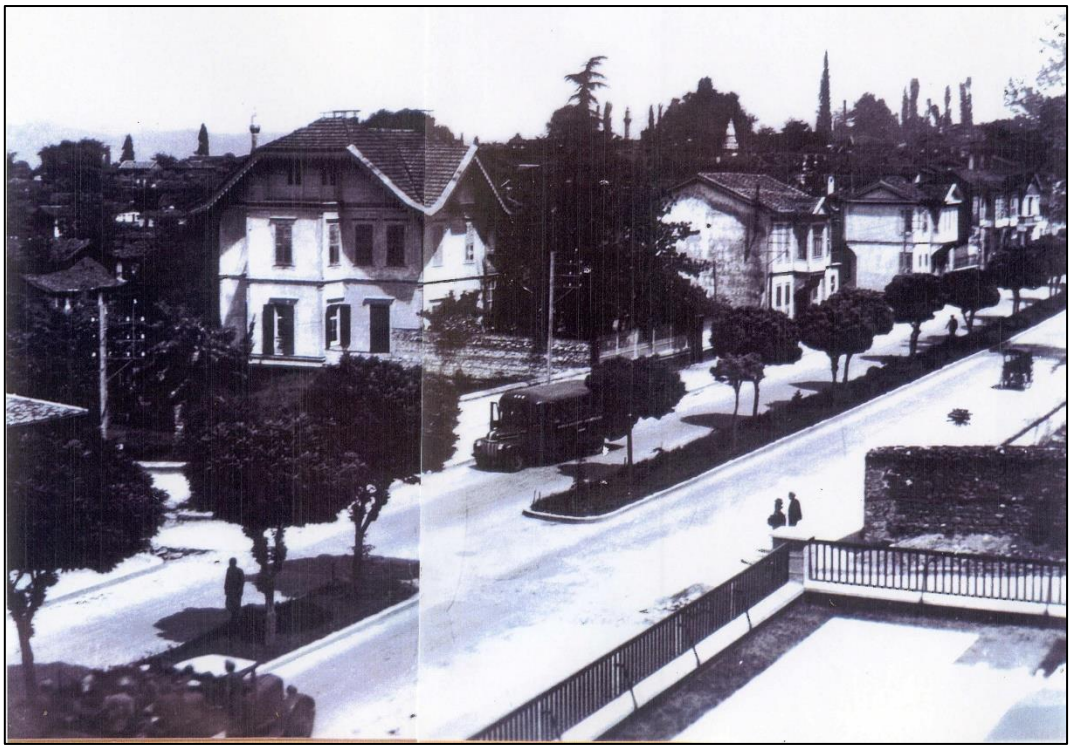

Figure 14 – Altıparmak Street in 1940's (Author's Archive)

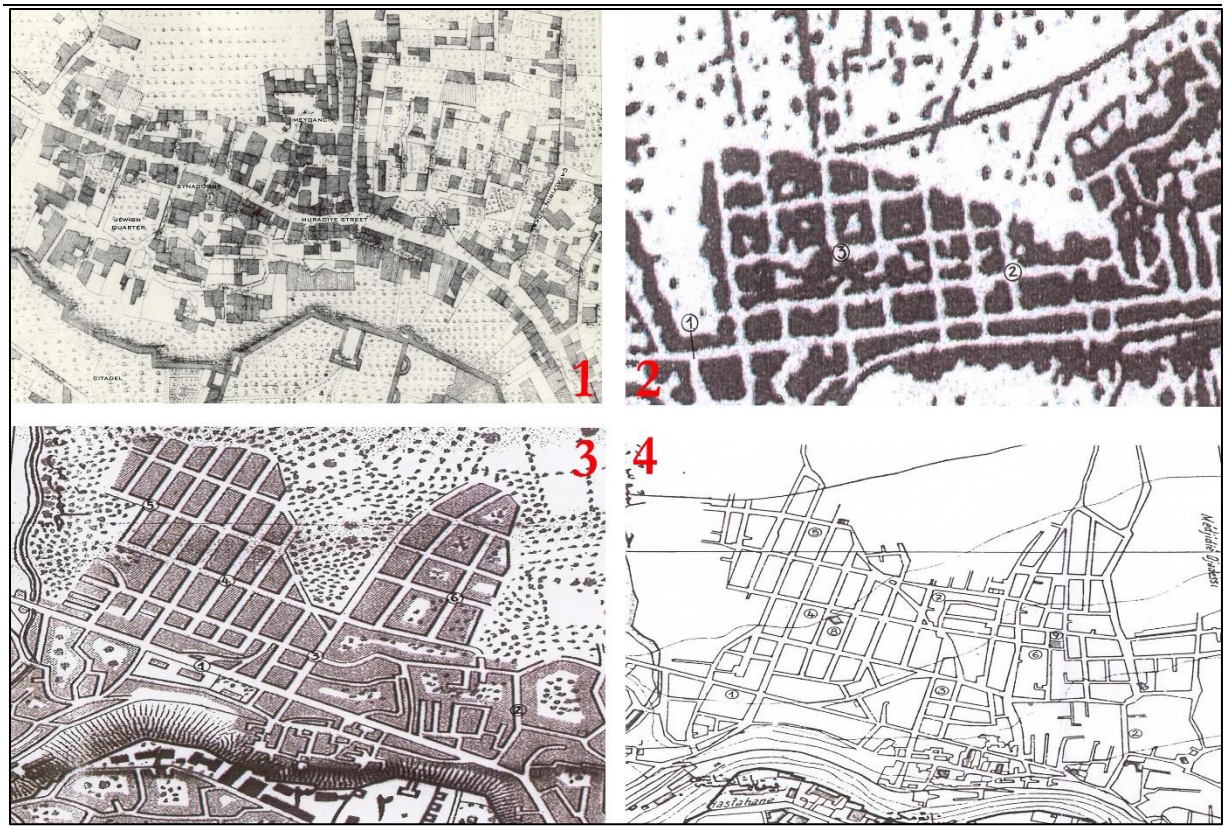

Figure 15 - Spatial Formation of Altıparmak Quarter
1862 Suphi Bey Map (1) in comparison with 1895 Map (2), 1907 Map (3) and 1922 Map (4)
(prepared by the author)

4. Conclusion

The urban morphology of Bursa, which preserved its traditional Ottoman characteristic till the 19th century, began to change from the second half of the century, under the western-inspired modernization reforms of *Tanzimat*. However, it should be pointed out that besides the institutional and legislative reforms being imposed by the Ottoman government, these reforms were implemented mainly as a result of personal initiatives, who were the governors or mayors, in the case of Bursa.

During this reform period, the priority was given to the repair and modernization of the road network, which included widening and straightening traditional major arteries of the city and eliminating the cul-de-sucs that was characteristic in traditional Ottoman mahalles. On the other hand, in some parts of the city, these implementations partially or totally demolished existing public or private buildings and brought a new spatial order and character to Bursa. This kind of a spatial transformation was also seen while re-planning the conflagrated neighborhoods where the orthogonal grids were superimposed over their traditional organic urban fabric.

Following the attempts to secularize the traditional institutions during *Tanzimat* period, many new administrative, military, educational, social and cultural buildings began to appear as

prominent landmarks in the urban fabric of Bursa. Although most of these buildings derived their architectural characteristics from western models, there was a continuity of the Ottoman tradition in siting of these buildings in the urban landscape, where the idea of visibility and accessibility had been major concerns of monumental architectural tradition of the Empire for centuries.

The traditional commercial center, as the heart of the trade and artisans' activities, continued its importance as the physical, economic and social center of Bursa, throughout the 19th century, too. Although the improvement of the existing road network and opening of new arteries damaged its traditional architectural fabric to an extent, these arteries eased the accessibility of the commercial center. Moreover, besides the existing commercial buildings, dating to the previous centuries, many new social and cultural buildings began to appear on and around these arteries, which resulted in the emergence of new focal points in the traditional center of Bursa from the end of the 19th century.

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Identifying Critical Success and Risk Factors of Airport Projects in Turkey Based on Public-Private Partnership

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Abstract

Public-Private Partnership (PPP) is a significant procurement method in providing a public service. in particular, airport projects which constitute the most capital-demanding infrastructures and the level of risks to which these investments are subjected to is a great significance. Based on extensive systematic literature review, critical success factors (CSFs), and risk factors were collected to design a structural questionnaire for professionals and experts for airports PPP projects in Turkey, 162 experts of which 67 of them responded. The results revealed that the most important CSFs and risk factors are identified and grouped by factor analysis test and combined in terms of 9 key performance indicator (KPI).

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Kamu-özel ortaklığı (PPP), kritik başarı faktörleri (CSF'ler), risk faktörleri, havaalanları, anahtar performans göstergesi (KPI)

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Türkiye'de Kamu-Özel Ortaklığındaki Havalimanı Projelerinin Kritik Başarı ve Risk Faktörlerinin Tanımlanması

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Öz

Kamu-Özel Ortaklığı (PPP), bir kamu hizmeti sağlamada önemli bir tedarik yöntemidir. özellikle en çok talepkar altyapıyı oluşturan havaalanı projeleri ve bu yatırımların maruz kaldığı risk düzeyi büyük önem taşımaktadır. Kapsamlı sistematik literatür taramasına dayanarak, 162'si uzman 67'si yanıt veren Türkiye'deki havaalanları PPP projeleri için profesyoneller ve uzmanlar için yapısal bir anket tasarlamak üzere kritik başarı faktörleri (CSF'ler) ve risk faktörleri toplandı. Sonuçlar, en önemli CSF'ler ve risk faktörlerinin, faktör analizi testi ile tanımlandığını ve gruplandırıldığını ve 9 temel performans göstergesi (KPI) açısından birleştirildiğini ortaya koydu.

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Introduction

Public-Private Partnership (PPP) involve public and private sectors working together as part of a partnership in order to provide public service (Broadbent & Laughlin, 2003). There are many models of PPPs, and these models are regularly used in construction projects in developed and developing countries, where the success of these projects is the ultimate goal of practitioners and government organizations. Saving resources in many ways is the main advantage of the PPP procurement process (Cumming, 2007), also sharing risks at different stages between public and private sectors (Shen, Platten, & Deng, 2006). Furthermore, improving the economic aspects by using PPP procurements. For instance, it has been shown that the PPP strategy reduce the lifecycle project cost (Tang, Shen, & Cheng, 2010). It is, therefore, not surprising that researchers continue to study this area of the PPP market (Osei-Kyei & Chan, 2015), which could help improve our understanding of the pros and cons of PPPs (LiYaning Tang, Qiping Shen, & Cheng, 2010). Although, many developed and developing countries have implemented PPP projects for developing their infrastructure in recent years, some of these projects have not been successful (Ismail Abdul Rahman, Aftab Hameed Memon, & Zulkiffli, 2014). Chou, Ping Tserng, Lin, and Yeh (2012) indicated that the most important CSFs in PPP is the risk allocation and sharing. For this reason, risks should be taken by parties whose can manage them effectively (Hwang, Zhao, & Gay, 2013). Risk identification and management are very important factors in PPP projects (Noorzai, Jafari, Golabchi, Hamedi, & 2016). Identifying and analyzing the risk area effectively to improve the use of risk strategies are essential (Tang et al., 2010). Furthermore, development of the infrastructure is complicated issue and when some of the CSFs are not given much importance, project risks might be emerged. For instance, political risk will arise when there is a lack of political support. Proper management strategies for the appeared risk as a response to better address these CSFs in the future is crucial for project sponsors when these risks are considered major (Wang, 2015). Ke et. al, (2009), reviewed the publications of PPP research trends from 1998 to 2008. Similarly, Tang et. al, (2010) conduct a review study for PPP studies published in top six journals in field of construction, Osei-Kyei and Chan (2015), apply systematical literature review to specify the most important CSFs for PPPs in the publication from 1990 to 2013.

For delivering a service, Turkey is the most active user of PPP contracts in Eurasia in recent years. Also, it has an ambitious PPP portfolio which is being planned to be realized in the coming years (Emek, 2015). Airport projects received the highest rate of investment, with US$38.3 billion committed. An unprecedented amount of this investment went towards Turkey's İstanbul New Airport (İGA) (Worldbank, 2015). Without doubt, the recent star of the PPP sector in Turkey has been the transportation sector (Başar, Bayirbaş, & Yilmaz, 2016). The initial target for Turkey's 2023 plans was to reach 60 fully operating airports capable of hosting

350 million passengers per year (PWC, 2017). Based on the 2023 target plan, the Turkish government is planning to increase the number of fully operating airports for domestic flights from 55 to 63 with the construction of new airports in Yozgat, Rize,Artvin, Bayburt-Gümüşhane (Salyazı), Niğde-Aksaray, Karaman, İzmir Çeşme-Alaçatı, Western Antalya and Çukurova. (PWC, 2017). For that purpose, the aim of this study is to identify and rank the critical success factors and risk factors of PPP projects, particularly for airports projects in Turkey, and to draw lessons for the effective management of these factors by investigating the relation between those factors.

Risk factors and CSFs in PPP projects in the literature.

Many researches have tried to classify the PPP projects risk factors in various sectors of developed countries(Bing, Akintoye, Edwards, & Hardcastle, 2005; Chung, Hensher, & Rose, 2010; Hwang et al., 2013) and developing countries (Effah Ernest Ameyaw & Chan, 2015; Song, Song, Zhang, & Sun, 2013). Cheung and Chan (2011) insistence that PPP projects need accurate risk factor identification and analysis that could adversely affect the project achievements. However, to achieve best project performance, successful partnership is needed between public and private sector, and understanding properly to how share and allocate the risk between them (Abednego & Ogunlana, 2006). Grimsey Darrin and Lewis (2002) evaluated the risks of PPP projects and they found that most common and effective risks facing any infrastructure projects are; technical, construction, operating, revenue, financial, force majeure, political and environmental risks. In addition, airport projects as one of the biggest infrastructure projects through PPPs strategy are subjected to more risks than any other infrastructure projects.

Critical success factors can be defined as the “few key areas of activity where favorable results are absolutely necessary for a manager to reach his/her goals” (Osei-Kyei & Chan, 2015; Rockart & Sloan, 1982). Numerous researches have been done and adopt the CSFs as a concept to understand the effective way for PPP implementation to develop the infrastructure in developed and developing countries (Liu, Wang, & Wilkinson, 2016; Osei-Kyei & Chan, 2015).The concept of CSFs has been studied in different areas of PPP sectors, including the water (Ernest Effah Ameyaw, Chan, & Owusu-Manu, 2017; Ernest Effah Ameyaw & Chan, 2016; Xianhai Meng, Qi Zhao, Qiping Shen, & M.ASCE3, 2011), telecommunications, housing (Abdul-Aziz & Jahn Kassim, 2011), energy and transportation sectors (Hemantkumar P. Bulsara, Alok Kumar, Rakesh Kumar, & Chauhan, 2016). Recently, attention has been given to study CSFs for PPP projects in developing countries by d researchers in many countries such as the UAE, Nigeria, Ghana and China (Ernest Effah Ameyaw & Chan, 2016; Rauda Al-Saadi & Abdou, 2016; Robert Osei-Kyei & Chan, 2016; Sanni, 2016; Solomon Olusola Babatunde, Srinath Perera, Lei Zhou, & Udeaja, 2016). Therefore, in the first part of this study a

systematically review of previous researches published between the years 2000 to 2018 for CSFs of PPP projects have been done as shown in table 1. This review study aims not only to reveal CSFs of PPP projects based on international publication in this area of study from different search engines such as Scopus and Web of science, but also to define the measures needed to be taken for further effective productivity in PPP projects. Based on this background, 20 CSFs of PPP projects have been taken into consideration as a part of the questionnaire which was used in this study. For that, a part of this article concentrates on defining and listing the most important CSFs for airport projects in developing countries particularly for Turkey.

Material and Method

Identification of PPP risk factors and CSFs that affect PPP projects are the important key factors needed to achieve project success. A comprehensive systematic review of publications in this area of study between the years 2000 to 2018 was carried out (Table 1). The review study was to identify and investigate the significant 46 risk factors and 20 CSFs of PPP projects in general and specifically transportation projects. These factors were carefully selected to contain the significant factors that affect PPP airport projects in developing countries.

Questionnaire process

Questionnaire survey as a strategy of collecting data is considered as an effective and popular method in many area of studies (Zhang, Chan, Feng, Duan, & Ke, 2016). Several researchers have used this approach to gain a comprehensive understanding of PPP risk factors and their allocation as well as critical success factors of PPP projects (Effah Ernest Ameyaw & Chan, 2015; Chou & Pramudawardhani, 2015; Hsueh & Chang, 2017; Osei-Kyei, Chan, Javed, & Ameyaw, 2017; Song et al., 2013). A questionnaire is a powerful tool used to collect expert opinions, for this research a ranking-type questionnaire survey was adopted to collect accurate data. The questionnaire was divided into 4 sections. The first section was about participant information such as level of knowledge and the respondent's profile. The second part aimed to investigate the experience of precipitance with PPPs. The third part contained scale-based questions that took into consideration the importance level of CSFs on PPP airport projects in Turkey. The last part contained the evaluation and the level of significance based on their effect on PPP airport project in Turkey. The questionnaire was written in both English and Turkish to guarantee an active questionnaire design. Ranking and evaluating the significant airports PPP risk factors and CSFs required accurate information collecting from experienced participants. Consequently, the survey focused on institutions that have direct involvement in airport PPPs from public and private sectors. The written questionnaire was mainly distributed by hand to respondents in Turkey (Ankara - Istanbul). Of the 162 questionnaires, 67 were retrieved, 5 of them were excluded to ensure high quality data, since

the participants exhibited insufficient knowledge and incomplete answers. In total 62 questionnaires were obtained after eliminating invalid questionnaires. The rate of response was 41.3%, while the valid data response rate was 37.6% as an outcome of all the questionnaires. The respondents were asked to evaluate and rank the importance of 20 CSFs and 46 risk factors based on 5-point Likert scale. The Likert scale has been adopted by many studies in many countries (Chou & Pramudawardhani, 2015; Roumboutsos & Anagnostopoulos, 2008). 73% of the respondents who completed the survey have a good experience and knowledge of PPPs. Furthermore, 64% of the participants made up the public sector such the General Directorate of State Airports Authority of Turkey (DHMI), while 31% of PPP experts were from private sectors, (construction companies).

Results and Discussion

Statistical Package for Social Scientists (SPSS) 25.0, has been used for data from the questionnaire. Statistical tests such as reliability analysis, mean analysis, variance analysis (ANOVA), correlation test and factor analysis were performed on the data. Reliability tests were carried out for reliability analysis which was carried out in order to check the consistency of the 20 critical success factors and 46 risk factors and as well as the reliability of the survey instrument. Cronbach alpha coefficient indicator normally used as an indicator, that when it is above 7.0 means the scale is considered acceptable and if it is more than 8.0 will be preferable (Pallant, 2016). The overall Cronbach's Alpha values for critical success factors and risk factors of PPP airport projects are 0.851 and 0.930, respectively, indicating a high internal consistency and reliability for the dataset. Twenty Critical Success Factors and 46 risk factors are ranked (1 being the most important and 5 being the least important, the order is reversed in analysis) according to respondent's views on what they consider to be the level of importance for PPP airport projects in Turkey. The mean value for each factor is ranked according to the categories; Public Sector (State), Private Sector and both sectors.

Ranking of CSFs of PPP airport projects

Ranking 20 CSFs based on their importance to airport PPP projects were asked to the survey participant according to a 5-point Likert Scale (1 being not important and 5 being extremely important). As shown in table 2 the mean values for the 20 CSFs range from 4.53 to 3.42. Therefore, mean values above 3.00 indicates the importance of that factor (Hair Jr., Black, Babin, & Anderson, 2010). All the factors displayed mean value are more than 3 but seven important factors displayed mean values are more than 4.00, and the others showed mean values range between 4.00 and 3.00 based on the ANOVA analysis test, where it is used to compare the evaluation of each factor in both sectors.

Table 1. CSFs for PPP projects from literature survey between 2000 to 2018.

CSF / Ref. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Sum
1. Risk allocation and sharing		*	*	*	*		*	*		*		*			*			*		*			*	*	*					*	*						*	*	18
2. Strong private consortium		*	*	*	*	*			*	*			*	*					*							*			*						*				14
3. Available financial market				*		*	*			*	*	*			*			*			*					*	*								*				14
4. Commitment made by partners			*	*	*			*									*				*			*			*	*							*			*	13
5. Transparent procurement	*	*	*			*	*				*		*				*						*												*				11
6. Political support		*						*	*		*				*							*									*	*							9
7. Favorable legal framework	*		*				*					*									*	*		*	*		*									*			9
8. Community / Public support	*	*	*					*																					*										5
9. Favorable economic condition			*															*																					3
10. Government guarantee							*				*						*									*													4
11.Alignment with government's objective						*														*																			2
12. Revenue sustainability			*											*																									3
13. Cost effectiveness	*			*			*																															4
14. Clearly defined responsibilities and roles			*	*				*					*																									6
15. Appropriate project identification	*														*					*						*												4
16. Selection of suitable subcontractors															*																								1
17. Effective supervision mechanism	*											*								*																			4
18. Technical feasibility of the project				*		*																	*																4
19. Stable macroeconomic environment																	*	*					*		*		*												7
20. Stable political and social environments																	*		*				*									*							5
21. National PPP unit																			*										*										3
22. Asset quality and social support																			*	*																			3
23. Adequate public advisory bodies									*													*					*												4
24. Effective management control																*				*			*				*										*		5
25. Good governance																				*			*																3
26. Openness and constant communication										*																		*	*										4
27. Competitive tendering																				*															*				2
28. Corruption eradication																					*																		1
29. Profitability																													*										2
30. Adherence to time																														*			*						2
31. Meeting output specification																															*								2
32. Project feedback																																							1
33. Reliable and quality service operation																															*								2

The most important seven CSFs are namely; available financial market, risk allocation and sharing, profitability, favorable legal framework, private consortium, effective supervision mechanism and appropriate project identification for PPP airports projects in Turkey. It is clear that there are some differences in the result of choosing the importance of these factors based on the opinion of the public and private experts. For example, public participates chose favorable legal frame work as the significant CSF for airports projects, while private ranked it at 16. On the other hand, both of them ranked some factors at the same level of importance, such as risk allocation and sharing, openness and constant communication, and public support. Similarly, they ranked the availability of the financial market as the most important factor for achieving success when it came to these projects.

Table 2. Mean ranking values of the CSFs for airport PPP projects.

	CSF	Criticality									Sign.
		Public			Private			Together			
		Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank	
C01	Available financial market	4.380	0.705	1	4.530	0.697	3	4.420	0.7	1	0.443
C02	Risk allocation and sharing	4.300	0.966	2	4.580	0.607	2	4.390	0.871	2	0.254
C03	Profitability	4.300	0.853	4	4.370	0.831	7	4.320	0.84	3	0.773
C04	Favorable legal framework	4.030	1.121	12	4.740	0.452	1	4.250	1.01	4	0.010
C05	Strong private consortium	4.180	0.931	8	4.370	0.831	5	4.240	0.897	5	0.444
C06	Effective supervision mechanism	4.130	1.042	9	4.440	0.784	4	4.220	0.974	6	0.251
C07	Appropriate project identification	4.250	1.032	5	4.110	0.875	10	4.200	0.979	7	0.600
C08	Meeting output with specifications	4.300	0.791	3	3.950	0.848	16	4.190	0.819	8	0.123
C09	Reliable and quality service operations	4.200	0.853	7	4.110	0.737	12	4.170	0.813	9	0.679
C10	Adherence of time	3.980	0.974	16	4.370	0.831	6	4.100	0.941	10	0.135
C11	Political support	3.980	1.074	14	4.320	0.946	8	4.080	1.039	11	0.242
C12	Commitment made by partners	4.100	0.632	10	3.950	0.78	13	4.050	0.68	12	0.425
C13	Clearly defined responsibilities and roles	4.100	0.852	11	3.950	0.78	15	4.050	0.826	13	0.506
C14	Competitive tendering	4.200	1.067	6	3.740	1.195	19	4.050	1.121	14	0.139
C15	Effective management control	3.980	0.891	15	4.110	0.809	11	4.020	0.861	15	0.591
C16	Satisfying the need for public facility	3.900	0.955	17	4.210	0.787	9	4.000	0.91	16	0.224
C17	Stable macroeconomic environment	4.030	0.743	13	3.840	0.834	17	3.970	0.772	17	0.400
C18	Openness and constant communication	3.880	1.159	18	3.790	0.918	18	3.850	1.08	18	0.779
C19	Transparent procurement	3.700	1.114	19	3.950	1.177	14	3.780	1.131	19	0.437
C20	Community / Public support	3.330	1.163	20	3.420	1.17	20	3.360	1.156	20	0.768

The most important CSFs from both views, public and private sectors, are: available financial markets, risk allocation and sharing, profitability, favorable legal framework, private consortium, effective supervision mechanisms and appropriate project identification for PPP airport projects in Turkey. However, public-sector experts, in comparison to those from the

private sector, stated that some factors were more important than the others. For instance, public experts rank favorable legal framework (C01) as the most important factor and at 1st position, while experts from the private sector rank it 12th out of 20, which indicates that the private sector in Turkey may not be as affected by the country's legal framework as the public sector, or perhaps the impact does not appear to be a major one or one that creates much concern for the private sector. Similarly, the period of time for finishing the project is an important critical success factor for the public sector and perhaps not as important for the private sector, referred to as adherence of time (C10). On the other hand, some factors are much more important to the private sector than to the public, such as profitability (C03), meeting output with specifications (C08) and competitive tendering (C14) (see table 2).

Risk Factors of PPP Airport Projects

Forty-six risk factors used in the survey are ranked based on the 5-point Likert scale (1 being the most important and 5 being the least important, order is reversed in analysis) according to respondents in what they consider to be the level of importance for PPP airport projects in Turkey. The mean value for each factor is ranked according to the categories; Public Sector (State), Private Sector and both sectors as shown in table 3. ANOVA analysis was used to compare the evaluation of each factor in both sectors. The mean values can be interpreted as important since most of the factors had a mean value of more than 3.0. In this regard, 46 risk factors were examined and ranked based on public and private experts' opinion in PPP airport projects. According to the data result, as shown in table 2, the most important risk factors for these projects from both the public and private point of view, are indicated as; availability of finance, stability, and poor financial market. Furthermore, it was evident that, experts from the public sector concentrated on financial factors as the most important factors, similar to the private sector, which indicates that financial factors should be further studied and investigated. From another perspective, there were some differences in ranking the importance of some factors between the outlooks of public and private experts. For instance, construction overrun risk and inadequate distribution of responsibilities and risk were picked as top risk factors from the public sector, while the private sector didn't give much importance to those factors. However, they classified some factors on the same level such as; availability of finance, residual risk, legislation change, strong political structure, change in tax regulation and maintenance costs that are higher than expected.

The ranking analysis in terms of the factors' importance indicates that all the factors are important. However, those such as availability of finance (R01), stability (R02), poor financial market (R03) and financial attraction of project to investors (R04) are the most crucial risk factors for these projects from both points of view, public and private, for successful airport projects in Turkey. It is clear that for both sectors the significant risk factors for these projects

in Turkey are those related to finance, and this is perhaps to be expected in nations with a fast pace in economic development. Moreover, other risk factors like financial attraction of project to investors (R04), high finance costs (R05), construction cost overrun (R07), inadequate distribution of responsibilities and risks (R08), and inadequate experience in PPP/PFI (R24) have been ranked much important in the public sector than the private sector. Further, low operating productivity (R13), influential economic events (R15), delay in project approvals and permits (R25), and poor public decision-making process (R28) are ranked as less important (see table 3).

Table 3. Mean ranking of the risk factors for airport PPP projects.

Risk factors		Criticality									Sign.
		Public			Private			Together			
		Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank	
R01	Availability of finance	4.59	.715	1	4.58	.692	3	4.59	.702	1	0.957
R02	Stability	4.38	.774	4	4.63	.597	1	4.44	.738	2	0.208
R03	Poor financial market	4.30	.911	5	4.63	.496	2	4.41	.904	3	0.144
R04	Financial attraction of project to investors	4.43	.844	2	4.21	.787	17	4.36	.826	4	0.356
R05	High finance costs	4.39	.823	3	4.26	1.284	14	4.35	.991	5	0.641
R06	Operational revenues below expectation	4.23	.862	9	4.47	.697	6	4.31	.815	6	0.277
R07	Construction cost overrun	4.26	.818	7	4.26	.991	15	4.26	.870	7	0.978
R08	Inadequate distribution of responsibilities and risks	4.30	.723	6	4.11	.994	25	4.24	.817	8	0.397
R09	Interest rate volatility	4.16	.898	13	4.39	.850	10	4.24	.881	9	0.376
R10	Operation cost overrun	4.08	.870	14	4.53	.697	4	4.22	.839	10	0.055
R11	Residual risks	4.18	.844	10	4.29	.920	12	4.21	.861	11	0.637
R12	Excessive contract variation	4.18	.813	11	4.21	.918	18	4.19	.840	12	0.881
R13	Low operating productivity	4.05	.876	21	4.47	.513	7	4.19	.798	13	0.056
R14	Inflation rate volatility	4.08	.917	15	4.39	.850	9	4.17	.901	14	0.223
R15	Influential economic events	4.03	.891	24	4.47	.697	5	4.17	.854	15	0.059
R16	Design deficiency	4.25	.840	8	4.00	1.054	31	4.17	.913	16	0.330
R17	Construction time delay	4.05	1.011	20	4.37	.684	11	4.15	.925	17	0.220
R18	Legislation change	4.08	.888	16	4.21	1.182	16	4.11	1.010	18	0.625
R19	Strong political structure	4.05	.904	18	4.16	1.015	20	4.08	.934	19	0.682
R20	Change in tax regulation	4.05	.876	19	4.16	1.119	21	4.10	.936	20	0.688
R21	Maintenance costs higher than expected	4.05	.749	22	4.16	.765	22	4.08	.749	21	0.610
R22	Level of demand for project	4.08	.694	17	3.94	.938	35	4.03	.772	22	0.556
R23	Inadequate distribution of authority in partnership	4.05	.783	23	4.00	.816	33	4.03	.787	23	0.822
R24	Inadequate experience in PPP/PFI	4.18	.712	12	3.67	1.085	42	4.02	.868	24	0.038

Table 3. Mean ranking of the risk factors for airport PPP projects. (continued)

R25	Delay in project approvals and permits	3.83	.931	35	4.42	.838	8	4.02	.938	25	0.021
R26	Poor quality workmanship	4.03	.920	25	4.00	.943	32	4.02	.919	26	0.923
R27	Organization and co-ordination risk	3.98	.832	26	4.05	1.224	30	4.00	.965	27	0.776
R28	Poor public decision-making process	3.85	.921	29	4.28	.752	13	3.97	.894	28	0.090
R29	Lack of commitment from either partner	3.85	.864	33	4.21	.855	19	3.97	.870	29	0.138
R30	Differences in working method and know-how between partners	3.85	.893	32	4.16	.834	23	3.95	.879	30	0.212
R31	Land acquisition (site availability)	3.88	1.042	28	4.11	.963	24	3.95	1.016	31	0.418
R32	Maintenance more frequent than expected	3.90	.995	27	4.05	.848	29	3.95	.944	32	0.562
R33	Unproven engineering techniques	3.85	.949	30	4.05	.911	27	3.92	.934	33	0.441
R34	Force majeure	3.83	1.13	34	4.05	1.353	26	3.90	1.199	34	0.500
R35	Material/labour availability	3.83	.874	36	4.05	.911	28	3.90	.885	35	0.360
R36	Late design changes	3.85	.802	31	3.89	1.049	37	3.86	.880	36	0.857
R37	Environment	3.70	1.203	38	3.95	1.026	34	3.78	1.146	37	0.443
R38	Geotechnical conditions	3.60	1.215	42	3.89	1.150	36	3.69	1.198	38	0.380
R39	Level of public opposition to project	3.73	.987	37	3.58	1.17	43	3.68	1.041	39	0.619
R40	Expropriation or nationalization of assets	3.63	1.03	40	3.74	.933	39	3.66	.974	40	0.690
R41	Insolvency/default of sub-contractors or suppliers	3.55	1.154	44	3.89	1.049	38	3.66	1.124	41	0.275
R42	Industrial regulatory change	3.63	.774	41	3.68	1.003	41	3.64	.848	42	0.804
R43	Third Party Tort Liability	3.70	.939	39	3.53	1.264	44	3.64	1.047	43	0.556
R44	Weather	3.55	1.239	43	3.74	1.240	40	3.61	1.232	44	0.591
R45	Lack of tradition of private provision of public services	3.50	.847	46	3.44	1.097	45	3.48	.922	45	0.834
R46	Staff Crises	3.53	1.281	45	3.21	1.228	46	3.42	1.262	46	0.376

Factor Analysis of the CSFs and Risk factors

Lingard and Rowlinson (2006) (as cited in Osie-Kyei et al. (2014), proposed a sample size of the ratio 1:5 (variable involved to sample size) for considering the suitability of factors analysis for this research. However, studies conducted by (Bing et al., 2005; Hardcastle, Edwards, Akintoye, & Li, 2005; Li, Akintoye, Edwards, & Hardcastle, 2005; Robert, Dansoh, & Ofori – Kuragu, 2014) with sample size (61 respondents) and (Robert et al., 2014) with 45 respondent were accepted even it is not with the suggested sample size ratio and satisfied all statistical tests (C., Lam, ASCE, Cheung, & Ke, 2010). For that, it can be decided that factor analysis test

can proceed with full confidence and reliability for this study. Factor Analysis of 20 CSFs and 46 Risk Factors for PPP airport projects are carried out to identify the dimensions that are latent. Correlations among variables are calculated using the SPSS V 25 software. A traditional correlation matrix (correlations among variables) is produced. Most correlations are medium positive correlations. Correlation between CSF total score and risk factors total score is strongly positive, .598, $p < .001$. Each data matrix has sufficient correlations to justify the application of factor analysis for both scales.

Monte Carlo PCA test criterion

This test is taken from parallel analysis, which was introduced by Horn, Çokluk and D. Koçak (Horn, 1965; Ömay Çokluk & Koçak, 2016). In Monte Carlo simulation test factors, be importance when Eigen value is more than the mean value of those obtained from the random uncorrelated data. Eigenvalues obtained with the latent root criterion method are compared with eigenvalues obtained from the random uncorrelated data. Monte Carlo PCA test criterion results indicated that the CSFs scale is represented by four components that explain 55,885 of variance and Risk Factors scale is represented by five components that explain 55,777 of variance. We can see that the fifth scale eigenvalue in the CSFs scale is less than the corresponding Monte Carlo value and the sixth scale eigenvalue in the Risk Factors scale is less than the corresponding Monte Carlo value. Table 4 shows the comparison of scales eigenvalues with Monte Carlo PCA random eigenvalues for both scales.

Table 4. Comparing Scales Eigen values with Monte Carlo PCA random eigenvalues

Scales	Eigen Values	1	2	3	4	5	6
CSFs	CSFs Values	5.5530	2.2300	1.7920	1.6240	1.2790	1.145
	Monte Carlo values	2.1703	1.9233	1.7599	1.6092	1.4711	1.3439
Risk Factors	Risk Factors values	12.343	4.637	3.141	3.094	2.442	2.063
	Monte Carlo values	3.2032	2.9220	2.6870	2.5274	2.3724	2.2223

Based on the Monte Carlo PCA test criterion results mentioned above, factor analysis test was run again with four factors for CSFs and five factors for Risk Factors. One criterion is used in interpreting the factor; factor loading which it is the correlation of the variables and the factors (Hair Jr. et al., 2010). "The criteria loadings of ±.50 or greater are considered practically significant and for criteria loading ±.30 to ±.40 are considered to meet the minimal level for interpretation of structure" (Joseph F. Hair JR., William C. Black, Barry J. Babin, & Anderson, 2010). Table 5 shows the structure matrix of factor loadings for each factor of the CSFs scale and indicates the result of the principal factor for 20 identified CSFs for PPP airport projects. It clear that, the total Eigen values for the three factors retained ranged from 2.032 to 3.337. The percentage of variance explained by the 1st factor is 27.703%, the 2nd factor is 11.130%,

the 3rd factor is 8.946% and the fourth factor is 8.106%. The 4 CSFs component are represented as: project planning and strategy, transparent management, project and process quality and stability.

Table 5. CSFs for PPP airport projects grouping after rotated factor matrix

CSFs Groupings		Factor Loading	Total	% 0f variance explained	Cumulative % of variance explained
CSFs Groups 1: Effective planning and strategy			3.337	27.703	27.703
C06	Effective supervision mechanism	.780			
C16	Satisfying the need for public facility	.732			
C07	Appropriate project identification	.635			
C03	Profitability	.585			
C17	Stable macroeconomic environment	.516			
C02	Risk allocation and sharing	.446			
CSFs Groups 2: Transparent Management			3.961	11.130	38.833
C15	Effective management control	.777			
C20	Community / Public support	.758			
C04	Favorable legal framework	.743			
C13	Clearly defined responsibilities and roles	.647			
C19	Transparent procurement	.613			
C10	Adherence of time	.610			
CSFs Groups 3: Project and Process Quality			3.558	8.946	47.779
C08	Meeting output with specifications	-.831			
C14	Competitive tendering	-.824			
C18	Openness and constant communication	-.700			
C09	Reliable and quality service operations	-.694			
CSFs Groups 4: Stability			2.032	8.106	55.885
C05	Strong private consortium	.696			
C11	Political support	.654			
C12	Commitment made by partners	.594			
C01	Available financial market	.484			
	Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.				

Table 6 shows the Structure Matrix of factor loadings for each factor of the Risk Factors scale. It is indicated that the total Eigen values for the five grouped factors ranged from 4.847 to 8.937. The percentage of variance explained by the five factors are 26.833%, 10.080%, 6.828%, 6.727% and 5.309% respectively. Similarly, the cumulative percentage of variance explained by the extracted five factors. It is noticeable that the risk factors of PPP airport projects are grouped into five sufficient component factors. Therefore, it can adequately represent the data of the five risk factors groupings. The five risk factors component are represented as:

construction risks, environmental and force majeure risks, operating risks, legal framework and regulatory risks and finance risks.

Table 6. Risk factors for PPP airport projects grouping after rotated matrix

Risk Factors Grouping		Factor Loading	Total	% 0f variance explained	Cumulative % of variance explained
Risk Factors Groups 1: Construction Risks			8.937	26.833	26.833
R21	Maintenance costs higher than expected	.816			
R13	Low operating productivity	.786			
R32	Maintenance more frequent than expected	.785			
R10	Operation cost overrun	.773			
R06	Operational revenues below expectation	.746			
R36	Late design changes	.744			
R17	Construction time delay	.660			
R35	Material/labor availability	.649			
R26	Poor quality workmanship	.605			
R07	Construction cost overrun	.558			
R33	Unproven engineering techniques	.547			
R12	Excessive contract variation	.545			
R28	Poor public decision-making process	.448			
Risk Factors Groups 2: Environmental and Force Majeure Risks			7.138	10.080	36.914
R44	Weather	-.844			
R38	Geotechnical conditions	-.819			
R37	Environment	-.817			
R34	Force majeure	-.710			
R11	Insolvency/default of sub-contractors or suppliers	-.682			
R46	Staff Crises	-.678			
R41	Residual risks	-.667			
R29	Lack of commitment from either partner	-.569			
R31	Land acquisition (site availability)	-.559			
Risk Factors Groups 3: Operating Risks			5.980	6.828	43.742
R30	Differences in working method and know-how between partners	.778			
R08	Inadequate distribution of responsibilities and risks	.729			
R27	Organization and co-ordination risk	.710			
R02	Stability	.627			
R24	Inadequate experience in PPP/PFI	.622			
R23	Inadequate distribution of authority in partnership	.616			
R19	Strong political structure	.594			
R15	Influential economic events	.547			
Risk Factors Groups 4: Legal Framework and Regulatory Risks			5.123	6.727	50.469
R18	Legislation change	.783			
R20	Change in tax regulation	.765			
R42	Industrial regulatory change	.751			
R39	Level of public opposition to project	.617			
R45	Lack of tradition of private provision of public services	.532			
R43	Third Party Tort Liability	.519			

Table 6. Risk factors for PPP airport projects grouping after rotated matrix (continued)

Risk Factors Groups 5: Finance Risks			4.847	5.309	55.777
R14	Inflation rate volatility	.863			
R09	Interest rate volatility	.852			
R03	Poor financial market	.652			
R01	Availability of finance	.649			
R04	Financial attraction of project to investors	.585			
R05	High finance costs	.566			
	Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization				

Conclusion

The increasing demand for public services and the need to bridge huge infrastructural gaps have pushed governments around the world to face major challenges in order to provide quality services with the PPP strategy. In this regard, researchers in developed and developing countries have conducted valuable studies into both the risk factors and critical success factors for implementing such policies since the beginning. However, very limited efforts have been made in PPP airport projects. The present study, therefore, aims to examine and identify the risk factors and the critical success factors of these projects in developing countries, or in our case Turkey. This study started with an extensive systematic review of the literature to identify 20 most common and important CSFs and 46 risk factors that affect PPP projects. Publication in this area were reviewed through popular research engines such as, Scopus and Web of Science between the years 2000-2018. An empirical questionnaire survey tested the relative importance of these potential factors. The data for this study was obtained through structured surveys distributed to 162 experts of whom of which 67 experts from both the public and private sector in Turkey completed the questionnaire on airport PPP projects. Regarding the relevance of data analysis, the reliability tests for factors suggest high internal consistency and reliability of the data with values for these factors at 0.851 and 0.930, respectively. Furthermore, ranking the significance of these factors by mean score values of the response data from the survey respondents.

Public and private sectors think that, the most important critical success factors for airports projects in Turkey are: available financial markets(C1), risk allocation and sharing(C2), profitability(C3), favorable legal framework(C4), private consortium(C5) which haven't much different than the results in the literature review. On the other hand, public sector idea about some other factors is different than private. For example, the public sector looks at factors like meeting output with specifications (C08) and competitive tendering (C14) as an important factor, but private rank them as less important. This indicates that project specification and

tendering competitive factors should be taken into the account for public sectors in developing countries. Similarly, factors such as availability of finance (R01), stability (R02), poor financial market (R03) and financial attraction of project to investors (R04) were ranked as the most significant risk factors from both sectors but with some differences. In developing countries like Turkey, public sectors look to financial risk as the most significant risk factor, while as private ranks stability as the most important factor. This leads to the fact that the private sector considers stability to be the most important risks that must be taken into consideration, especially the political stability of the state, while the public sector considers finance as the most important risks to be considered.

Factor analysis test was conducted to determine the principle factor grouping of critical success and risk factors. This revealed four and five factors grouping accounting for about 55.885% and 55.777% of all overall variances between CSFs and risk factors respectively. Those grouping factors combined together in terms of 9 KPIs and listed as; construction risks, environmental and force major risks, operating risks, legal framework, and regulatory risks, financial risks, project planning and strategy, transparent management, project and process quality and stability. These KPIs therefor represent the basic elements of critical and risk factors for airport projects and should be considered by the public sector for shaping their PPP policy development, and by private for managing their projects perfectly, particularly for airports projects.

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