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ÖNSÖZ

Harita Mühendisliği , gelişen teknolojiyle de birlikte bir çok bilim dalıyla işbirliği içinde olan bir mühendislik dalıdır.Konum üzerinde yapılan her türlü bilimsel çalışma bu alanla ilişkili olarak ele alınmaktadır. Günümüzde çok sık kullanılan bilgi sistemlerinin konumla ilişkilendirmesi gerekliliği harita mühendisliğini inter disipliner bir dal haline getirmektedir.

Bu kitabın amacı gerek harita mühendisliği ve gerekse harita mühendisliğiyle disiplinler arası yapılan çalışmaları değerlendirmek ve kullanıcıların hizmetine ve bilgisine sunmaktır. Mekanla ve konum bilgisiyle ilişkilendirilen tüm mühendislik dallarının yayınlarını değerlendirmek hedeflenmektedir.

Şehir ve bölge planlaması , inşaat , jeoloji,mimarlık , enerji sistemleri , orman ,peyzaj mimarlığı, zıraat gibi konumsal bilgi üzerinde çalışan bilim dallarıyla yapılan yayınlar bu kitap kapsamında yer alabilecektir.Uzaktan algılama , Cografi bilgi sitemleri,Bilişim teknolojileri gibi mekana dair bilgi üreten yayınlarda bu kapsamda yer alacaktır.

Günümüzde konum bilgilerinin atmosfer dışından da elde edilmesi nedeniyle uydu ve uzay teknolojilerinin ve uyduların çektiği resimler üzerinden elde edilen konumsal bilgilerin tüm bilim dallarinda kulanılması da bu tür yayınların bu kitap kapsamında değerlendirmemizi sağlayacaktır.

Gayrımenkul değerleme konusu da hem harita mühendisliği ve hem de ekonomi ile ilgili bir çok bilim dalının ilgi alanına

girmektedir. Gayrımenkul değerleme konusundaki çalışmalarda bu kitapda yer alacaktır.

Bu kitabın tüm yararlanıcılar için hayırlı olmasını diliyor. Tüm bölüm yazarlarımıza şimdiden teşekkür ediyoruz.

Editör
Doç. Dr. Fazıl Nacar

İÇİNDEKİLER

BÖLÜM I

Açık Maden ocaklarının Rehbilitasyonu konusunda öneriler: Osmaniye Örneği

Fazıl NACAR

1.Giriş

Ülkelerin enerjiden sonraki temel gereksinim maddeleri endüstriyel kayaçlar ve minerallerdir. Türkiye yer altı ve yer üstü kaynakları bakımından zengin bir ülkedir ve yer üstü kaynaklarını oluşturan kayaçların maden ocakları işletmeleri ile çıkartılması ülke ekonomisi için önem arz etmektedir (İncekara vd., 2018). Taş ocakçılığı toplum ve çevre için olumsuz bir endüstri olabilse de, taş ocakçılığının gerekliliği yadsınamaz. İnsan uygarlığının sanayi devriminden bu yana olduğu gibi devam etmesi için, evlerimizin temellerini, çimento, beton, asfalt ve kırmataşlı ulaşım yapılarını ve diğer endüstriyel kullanımları oluşturmak için taş ocaklarından kaynakların çıkarılmasına ihtiyacımız var. Aşındırıcılar, bağlayıcılar, katkı maddeleri ve çatı kaplama olarak. Dünya çapında milyonlarca insan taş ocakçılığı uygulamalarında istihdam edilmektedir ve bu nedenle taş ocağı endüstrisinin kaldırılması

sayısız aile için iş kaybına neden olacaktır. Bu nedenle, taş ocakçılığının olumsuz etkilerini gidermek için, taş ocakları faaliyete geçtikten sonra kaynakları tükenen alanları başka uygulamalar için kullanmalıyız. Taş ocağı sahalarının çeşitli sürdürülebilir kullanımlara potansiyel dönüşümü, yalnızca taş ocakçılığının olumsuz etkilerini gidermekle kalmayacak, aynı zamanda daha büyük sosyal, çevresel alanlar yaratabilir.

Maden ve Petrol İşleri Genel Müdürlüğü (MAPEG) tarafından yayınlanan verilere göre 2021 yılında faaliyette olan mermer ocağının da bulunduğu II(B) gurubu sayısı bir önceki yıla göre %127 artarak toplam 4647 adet olmuştur. Ayrıca MAPEG tarafından Türkiye'de madencilik faaliyetleri için arama ve işletme olarak iki adet ruhsat verilmekte olup mevcut durumda yaklaşık olarak toplam 14.721 adet açık maden sahasının işletme ruhsatı bulunmaktadır (URL-1).

Dünyada birçok ülkede yasal düzenlemeler ve uygulamalar, madencilik faaliyetleri nedeniyle bozulan arazinin, madencilik faaliyetleri sona erdiğinde yeniden düzenlenmesini ve gerekli kılmakta ve desteklemektedir. Doğa onarımıyla ilgili yapılan uygulamaların sonuçlarına göre madencilikle bozulmuş doğal peyzajın, onarım ve yenileme çalışmalarıyla, doğaya yeniden kazandırılmasını mümkündür.(Yaşam Ulusoy*, Tülay Ayaşlıgil,2012)

Yüzey madenciliğinin bazı olumsuz etkileri vardır. Görcelioğlu (2002)'de bu etkiler Darmer (1992)' ye göre aşağıda sıralanmıştır.

● Bitki örtüsünün tahribatı dolayısıyla doğal besin zinciri ve madde döngülerinin zarar görmesi

● Maden alanındaki yüzey ve yer altı sularının yapılarında ve niteliklerindeki olumsuz değişiklikler,

● Çevresel toz ve gürültü etkisi,

● Jeomorfolojik yapının olumsuz yönde değişimi,

● Alanın çevresi de dahil olmak üzere iklimsel değişimler,

● Toprak canlılarının ve o alandaki faunanın kaybı ya da zarar görmesi,

● Verimli üst toprak kaybı, ● Görsel bozukluklar ve canlı/ kültürel varlık kayıplarıdır (Kalaycı 2016)

Bu kapsamda Osmaniye ilinde bulunan faaliyetini yitirmiş belirlediğimiz taş ocaklarının (Şekil-1) rehabilitasyonunun tasarımında herhangi bir ekosistemin dört temel boyutu dikkate alınmalıdır; manzara, fonksiyon, yapı ve bileşim. Nohuttepe, sakızgediği kum ocağı ve çağşak maden ocağı (Tablo-1) rehabilitasyon uygulamalarında bu dört temel boyut dikkate alındı. Buradan, dört temel boyuta dayalı bir çerçeve, birlikte kendi kendini idame ettiren ve dirençli bir ekosistemi amaçlayan maden rehabilitasyonunu planlama, üstlenme ve izleme aracı olarak önerilmektedir. Bu çerçevenin unsurları endüstride kullanılmaktadır ve araştırmalarla desteklenmektedir. Çerçeve, bir endüstri standardı olarak kullanılabilir, düzenleyici kurumlar tarafından kullanılabilir ve potansiyel olarak diğer modellerle birlikte ve diğer rehabilitasyon ortamlarında kullanılabilir.Madencilik yapılmış saha da bütünüyle yeni ve başlangıçdan değişik bir düzenleme için gerekli koşulların oluşturulmasına rehabitasyon denmektedir. (ŞİMŞİR et al., 2007)

2.Materyal ve Metot

2.1 Çalışma Alanı

Osmaniye şehri Çukurova'nın ve Akdeniz Bölgesi'nin doğusunda bulunmaktadır Doğuda Gaziantep, batıda Adana, kuzeyde Kahramanmaraş güneyde Hatay, illeri ile komşudur. İlin batı kesimlerinde doğuya doğru Adana ovası ovaları uzanır. Osmaniye'nin güneyinde İskenderun Körfezi'nden itibaren uzanan Amanos Dağları, kuzeybatı ve kuzeydoğuda uzanan Toros Dağları, doğuda Düldül ,Dumanlı, ve Tırtıl Dağları ile çevrilidir. 1933 yılında ilçe haline getirilerek Adana'ya bağlanan Osmaniye, 1996 yılında 80. il olarak yeni idari yapısına kavuşmuştur. Akdeniz Bölgesi ve Çukurova'nın doğusunda yer alan Osmaniye; 35 52'-36 42' Doğu

Meridyenleri ile 36 57'-37 45' Kuzey Paralelleri arasında yer alır. (Koç,E.2008)

İlin deniz seviyesinden yüksekliği 121 m ve yüzölçümü 3222 km2 'dir. Akdeniz'e 20 km uzaklıktadır. Osmaniye ,Türkiye'nin coğrafi alan bakımından 67. büyük ilidir. Osmaniye, Akdeniz Bölgesini Doğu ve Güneydoğu Bölgelerine bağlayan karayollarının geçiş güzergahı üzerinde bulunmaktadır. Osmaniye ilinde nüfus arttıkça, enerji, konut ,iletişim, ulaşım vb. alanlardaki ihtiyaçlar da artmaktadır. Bu artışın, kentleşme ve sanayileşmenin çevreye olumsuz etkileri göz ardı edilemeyecek kadar önemlidir. (Koç, E.2008)

2.2. Açık Maden Ocakları Kulanım Mevzuatı

1. madde – Amaç, devletin kontrolü ve tasarrufu altındaki maden kaynaklarının aranması, işletilmesi, geliştirilmesi ve üretilmesi amacıyla Bakanlıkça gerçek ve tüzel kişilere belirli bir süre için hak verilmesine ilişkin mevzuatı düzenlemektir.

2. madde Kapsam – 1) Petrol, doğal gaz, jeotermal ve su kaynakları dışında, yer kabuğunda ve su kaynaklarında doğal olarak oluşan, ekonomik ve ticari değeri olan her türlü madde maden olarak kabul edilir. (2) Bu Yönetmelik; a) Ruhsat ve sertifika verilmesi, maden arama, işletme dönemi işlemleri, ruhsat alanlarının değiştirilmesi, faaliyetlerin denetlenmesi ve kontrolü, keşif hakkı, terk, iptal, devir ve devir, arama ve işletme ruhsatı aşamalarında maden arama ve üretim esasları, Genel Müdürlüğe teslim edilecek rapor, proje ve belgeler, ödenecek fiyatlar, alınacak işletme izinleri, maden sicili, kamu yararı ve kamulaştırma işlemleri, b) Maden arama ve işletme faaliyetleri ile kamu veya gerçek/tüzel kişilere ait kamu yararına olan yatırımlar Kamu kurumlarının birbirleriyle, maden arama ve işletme faaliyetlerinin uygulamaları nedeniyle imkansız hale gelmesi ve kamuya veya gerçek/tüzel kişilere ait yatırım için başka alternatif alanların bulunamaması halinde yapılacak prosedürler, c)Kamu kurum ve kuruluşlarının yaptığı kamu yatırımlarından sorumlu şirket tarafından veya yap-işlet-devret modeliyle projeler. Kullanılacak yapı ve inşaat

hammaddelerinin üretimine ilişkin izin verilmesine ilişkin usul ve esasları kapsar.

Materyal olarak ulusal ve uluslararası makale, bildiri, Osmaniye Çevre ve Şehircilik il müdürlüğü ve Osmaniye İl Özel idaresi dataları, rapor ve planlarıları analiz edilmiştir. Kaynaklar, bölgenin ve bölgenin doğal ve kültürel yapısına ilişkin plan ve raporlar, hava fotoğrafları, lisansüstü tezler ve araştırmalardan oluşmaktadır. Ayrıca araştırma alanında yükseklik örnekleri ve fotoğraflar alınarak peyzaj tespiti yapılmıştır.

2.3. Harita Üzerinden kübaj Hesabı

Gelişen bilgisayar destekli çizim yazılımları (Netcad) sayesinde geleneksel yöntemle (elle çizim) belirli mesafelerde ve/veya uygulama noktalarında (güzergâhın eşyükselti eğrilerini kestiği noktalar vs) en kesit alımları yapılırken, günümüzde istenilen aralıklarla (metre ve/veya cm) en kesitler alınarak kazı-dolgu hacimlerinin, 3 gerçeğe daha yakın tahmin edilmesine imkân sağlanmaktadır. Söz konusu yazılımlar sayesinde, yol projelendirilmesinde temel altlık olarak kullanılan farklı eş yükselti eğrilerine-aralıklarına sahip topoğrafik altlıklar (1/25000, 1/10000, 1/5000 vb.) kullanılmıştır.

2.4. Google Earth Üzerinden Kot Hesabı

Haritada çizilen yolun (hattın) en kesitini çıkartmak için uygulama üzerinden Yükseklik profiline girilmesi gerekir.Yolun kotu ve eğimi her nokta için alınabilmektedir. Yükseklik profili oluşturmak amacıyla, ilk olarak en kesitini çıkarmak istediğiniz hattı çokgen ve çizim aracıyla tanımlamak ya da Yerler panelinden bir yol seçilmesi gerekmektedir. Daha sonra, Yükseklik profili iki durumda görülebilir. Düzenle> Yükseklik Profilini Göstere tıklayarak veya Yerler panelinden yola sağ tıklayıp Yükseklik Profilini Göster tıklayarak kot verileri elde hesaplanabilir.

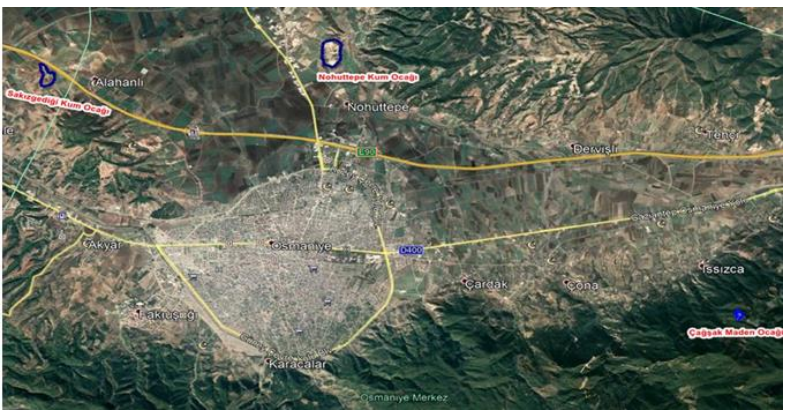
3. Uygulama

3.1. Topoğrafik Harita ve Google Earth Üzerinden kübaj hesabı

Adana-Şanlıurfa otoyolu yapımı için açılan nohuttepe kum ocağı , sakızgediği kum ocağı ve Çağşak mermer ocağı açık ocak madenciliği yani hammadde tedarik amaçlı madencilik işletmesi yapılmaktadır. Açık ocaklarda maden yatağı mineral veya tabakalıdır, yüzeyin şekli gibi arazi özellikleri rehabilitasyon sürecini belirler ve etkiler. Bu çalışmada Osmaniye İlli Merkez ilçede seçilen 3 adet açık maden ocağının (şekil -1 ve Tablo-1) kübaj hesabı yapılmıştır.

Tablo 1 Maden Ocağı Listesi

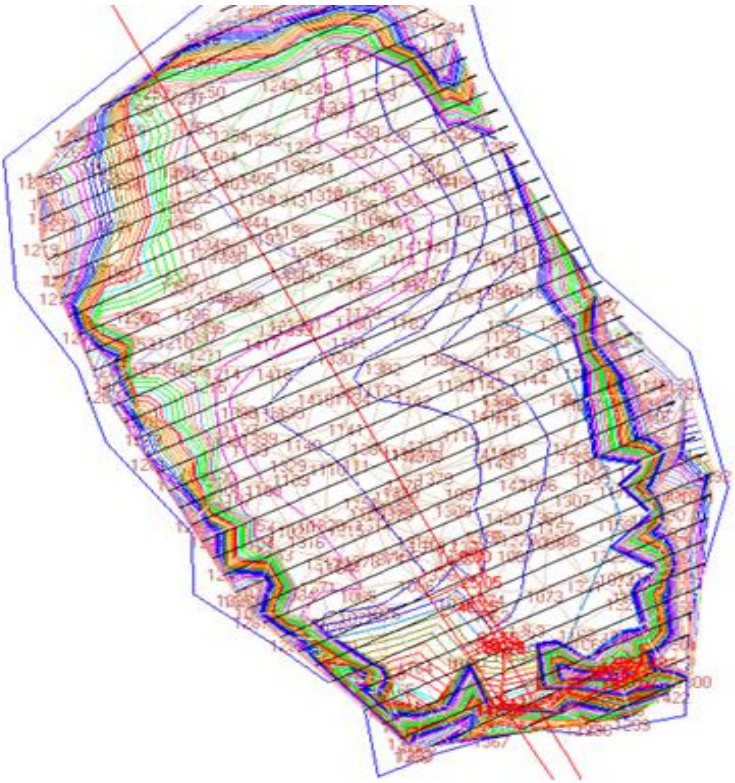
İşleticinin Adı-Ünvanı	BulunduğuYer	Hammadde Cinsi	Ruhsat Alanı (hektar)	izin Süresi (yıl)	İşletme Yöntemi
Karayolları 5. Bölge Müdürlüğü	Osmaniye- Nohutepe Köyü	Kum	33.66	*	Patlatmasız
Karayolları 5. Bölge Müdürlüğü	Osmaniye- Sakızgediği Köyü	Kum	15.75	*	Patlatmasız
Özel Teşebüs	Osmaniye- Çağşak Köyü	Mermer	2.8	*	Patlatmasız



Şekil-1 Kum Ocağı Bölgeleri

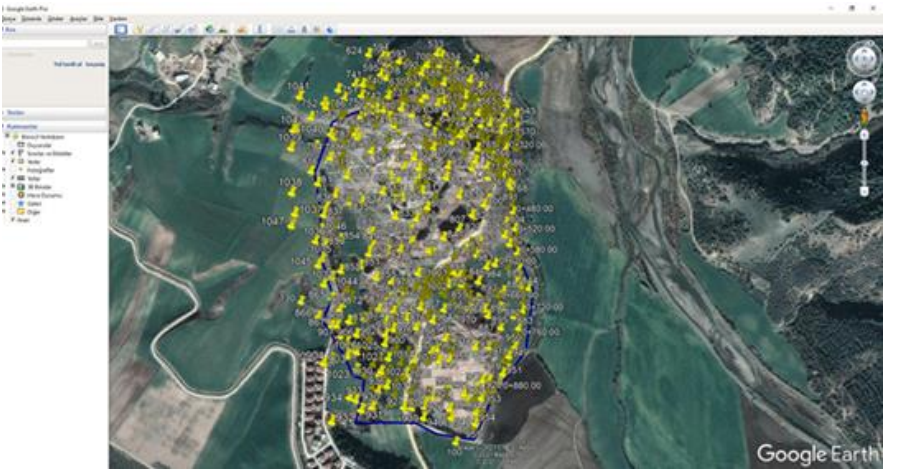
3.1.1 Nohuttepe Kübaj Hesabı

1/ 25000 lik haritalar kullanılarak izohips eğrili haritadan sayısal arazi modeli (SAM) üretilmiştir. (Şekil 1). Sayısal arazi modeli üretiminde kullanılan yöntemlerle arazi topoğrafyasını bilgisayar ortamında modellemektedir. Bu çalışmada SAM üretimi aşamasında üçgenleme metodu kullanılmıştır. SAM bilgilerine göre en düşük arazi kotu 113 m, en yüksek arazi kotu 142 m ve ortalama yükseltisi ise 127.5 m'dir. Nohuttepe köyü sınırlarındaki taş ocağı 102ada 7,14,15ve 131 nolu kadastro parsellerinde yer almaktadır.



Şekil-2 Nohuttepe SAM modeli

Son durum için ise Google earth kullanılarak kotlar alınıp eğri geçirilip üçgenleme yapılarak son durum SAM üretilmiştir.(ŞEKİL -2)



Şekil-3 Nohuttepe Google earth kulanılarak hazırlanan kulanım sonrası arazi modeli

Uygulamada enkesit aralığı 20 m olmak üzere bilgisayar ortamında otomatik olarak tespit edilmiş olan 40 adet enkesit için, toplam kazı hacmi 2469396.348 m3 , toplam dolgu hacmi 6672490.820 m3 , net hacim ise 4203094.47 m3 (2469396.348 m3 - 6672490.820m3=-4203094.47 m3) olarak hesaplanmıştır.(Tablo-2)

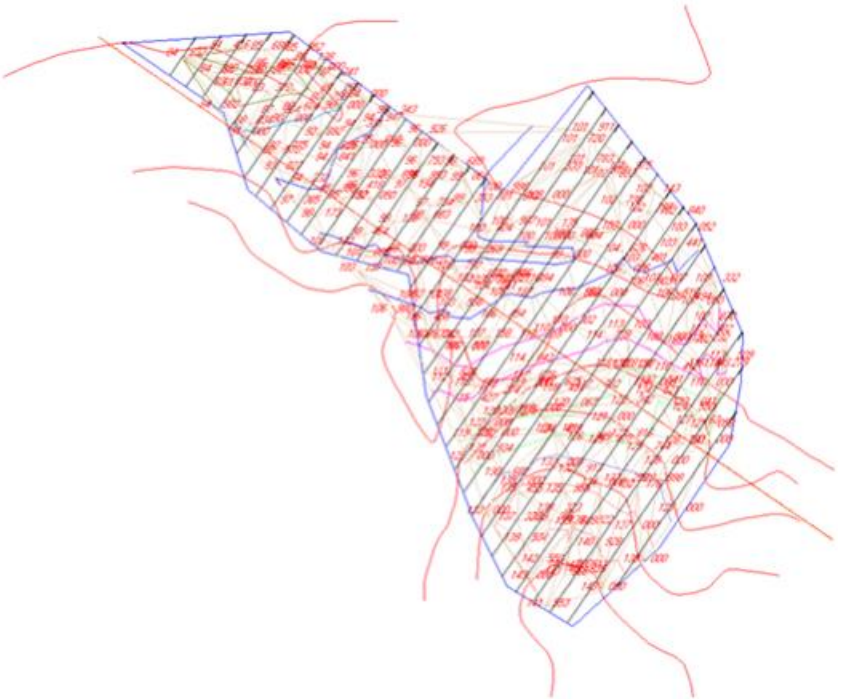
TABLO 2 Nohuttepe Kübaj Hesabı

Kilometre	Ara Uzaklık	ALAN (m2)		HACİM (m3)		KÜMÜLATİF HACİM (m3)		BROKNER EĞRİSİ
	(m)	YARMA	DOLGU	YARMA	DOLGU	YARMA	DOLGU	
	0.00			-	-			
0+160.00		-	6203.324			-	-	+0.000
	20.00			-	255303.380			
0+180.00		-	19327.014			-	255303.380	-255303.380
	20.00			0.348	382084.770			
0+200.00		25.963	18881.463			0.348	637388.150	-637387.802
	20.00			1455.270	357459.030			
0+220.00		119.564	16884.446			1455.618	995047.240	-993591.622
	20.00			7556.390	311869.490			
0+240.00		636.075	14302.503			9012.008	1306916.730	-1297904.722
	20.00			18201.610	287290.300			
0+260.00		1184.086	14426.527			27213.618	1594207.030	-1566993.412
	20.00			27084.390	269850.600			
0+280.00		1524.353	12558.533			54298.008	1864057.630	-1809759.622
	20.00			35040.030	249867.420			
0+300.00		1979.650	12426.209			89338.038	2113905.050	-2024567.012
	20.00			44328.990	236765.260			
0+320.00		2453.249	11248.317			133667.028	2350650.310	-2216983.282
	20.00			49051.260	198217.190			
0+340.00		2451.879	8573.402			182718.308	2548867.500	-2346149.192
	20.00			44772.930	131776.600			
0+360.00		2025.414	4604.278			227491.238	2680644.300	-2453153.062
	20.00			35737.220	82119.910			
0+380.00		1548.308	3607.713			263228.458	2762764.210	-2499535.752
	20.00			25649.080	59858.260			
0+400.00		1014.600	2378.113			288877.538	2822622.470	-2533744.932
	20.00			18735.770	53175.420			
0+420.00		856.977	2939.429			307613.308	2875797.890	-2568184.582
	20.00			23323.400	60417.600			
0+440.00		1475.363	3102.331			330936.708	2936215.490	-2605278.782
	20.00			38392.620	57010.270			
0+460.00		2363.859	2598.696			369329.328	2993225.760	-2623896.432
	20.00			52721.730	63462.730			
0+480.00		2908.274	3747.577			422051.058	3056688.490	-2634637.432
	20.00			63531.390	76845.830			
0+500.00		3444.865	3937.006			485582.448	3133534.320	-2647951.872
	20.00			71323.520	87451.340			
0+520.00		3687.467	4808.128			556905.968	3220985.660	-2664079.692
	20.00			75496.190	104147.160			
0+540.00		3862.132	5606.588			632402.158	3325132.820	-2692730.662
	20.00			76559.900	117849.150			
0+560.00		3793.858	6178.327			708962.058	3442981.970	-2734019.912
	20.00			74566.060	124071.260			
0+580.00		3642.748	6228.759			783528.118	3567053.230	-2783525.112
	20.00			77357.200	138139.970			
0+600.00		4072.972	7585.198			860885.318	3705193.200	-2844307.882
	20.00			87687.000	157389.470			
0+620.00		4635.720	8153.743			948572.318	3862582.670	-2914010.352
	20.00			93647.710	171867.240			
0+640.00		4669.043	9032.375			1042220.028	4034449.910	-2992229.882
	20.00			90043.170	179612.470			

Kilometre	Ara Uzaklık	ALAN (m2)		HACİM (m3)		KÜMÜLATİF HACİM (m3)		BROKNER EĞRİSİ
	(m)	YARMA	DOLGU	YARMA	DOLGU	YARMA	DOLGU	
0+660.00		4335.274	8928.272			1132263.198	4214062.380	-3081799.182
	20.00			77868.430	196653.380			
0+680.00		3451.569	10737.066			1210131.628	4410715.760	-3200584.132
	20.00			57266.760	234217.060			
0+700.00		2275.107	12684.640			1267398.388	4644932.820	-3377534.432
	20.00			41845.190	245186.760			
0+720.00		1909.412	11834.036			1309243.578	4890119.580	-3580876.002
	20.00			49045.760	177190.060			
0+740.00		2995.164	5884.970			1358289.338	5067309.640	-3709020.302
	20.00			63832.490	135047.750			
0+760.00		3388.085	7619.805			1422121.828	5202357.390	-3780235.562
	20.00			94328.490	143788.880			
0+780.00		6044.764	6759.083			1516450.318	5346146.270	-3829695.952
	20.00			137828.000	130524.350			
0+800.00		7738.036	6593.352			1654278.318	5476670.620	-3825392.302
	20.00			135757.910	148581.600			
0+820.00		5837.755	8264.808			1790036.228	5625252.220	-3838215.992
	20.00			117971.890	137495.360			
0+840.00		5959.434	5484.728			1908008.118	5762747.580	-3857739.462
	20.00			134066.200	123973.260			
0+860.00		7447.186	6912.598			2042074.318	5886720.840	-3847646.522
	20.00			166920.660	136435.100			
0+880.00		9244.880	6730.912			2208994.978	6023155.940	-3817160.962
	20.00			135501.890	161149.320			
0+900.00		4305.309	9384.020			2344496.868	6187305.260	-3842808.392
	20.00			70086.590	216350.030			
0+920.00		2703.350	12250.983			2414583.458	6403655.290	-3989071.832
	20.00			37592.270	194597.350			
0+940.00		1055.877	7208.752			2452175.728	6598252.640	-4146076.912
	20.00			17220.620	74238.180			
0+960.00		666.185	215.066			2469396.348	6672490.820	-4203094.472

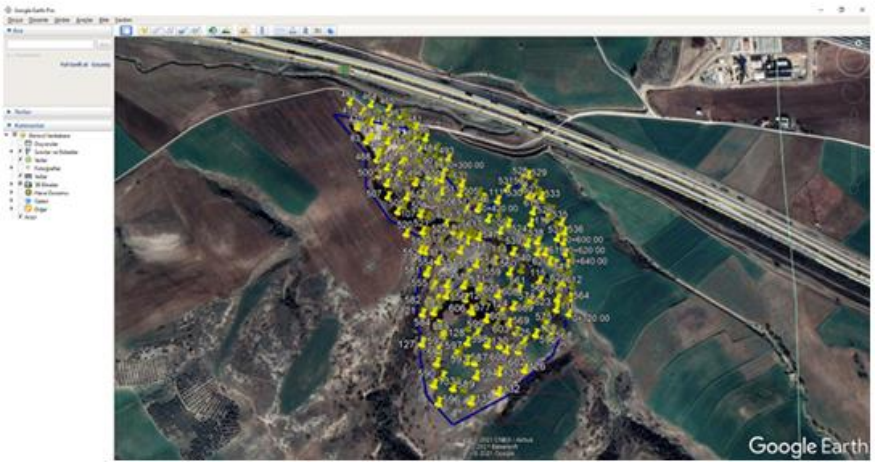
3.1.2 Sakızgediği Kübaj Hesabı

1/ 25000 lik haritalar kullanılarak eş yükselti eğrili haritadan sayısal arazi modeli (SAM) üretilmiştir (Şekil 2). SAM üretiminde kullanılan teknikler arazi topoğrafyasını bilgisayar ortamında modellemektedir. Bu çalışmada SAM üretimi aşamasında üçgenleme metodu kullanılmıştır. SAM bilgilerine göre en düşük arazi kotu 47 m, en yüksek arazi kotu138 m ve ortalama yükseltisi ise 92,5 m'dir.Toprakkale ilçesi Arslanpınarı köyü sınırlarındaki taş ocağı 115 ada 2 nolu kadastro parselinde yer almaktadır.



Şekil-4 Sakızgediği SAM modeli

Son durum için ise Google earth kullanılarak kotlar alınıp eğri geçirilip üçgenleme yapılarak son durum SAM üretilmiştir.(Şekil - 5)



Şekil-5 Sakızgediği Google earth kullanılarak hazırlanan kulanım sonrası arazi modeli

Uygulamada en kesit aralığı 20 m olmak üzere bilgisayar ortamında otomatik olarak tespit edilmiş olan 34 adet en kesit için, toplam kazı hacmi 336961.700m3, toplam dolgu hacmi 134130.102m3, net hacim ise 202831.598 m3 (336961.700m3-134130.102m3=-202831.598 m3) olarak hesaplanmıştır.(Tablo-3)

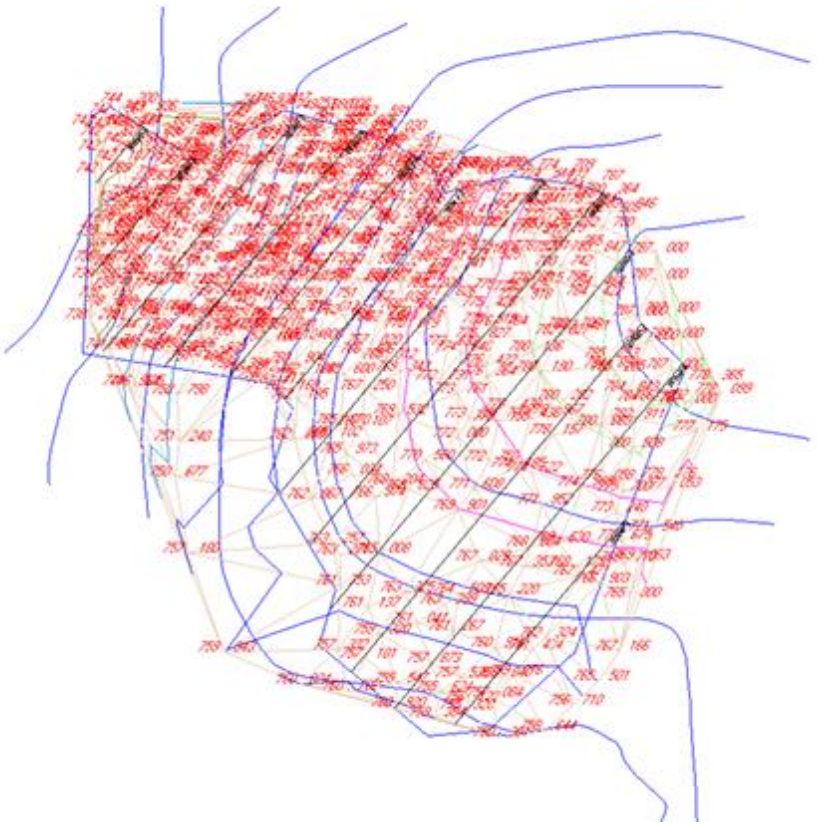
Tablo-3 Sakızgediği Kübaj Hesabı

Kilometre	Ara Uzaklık (m)	ALAN (m2) YARMA	ALAN (m2) DOLMA	HACİM (m3) YARMA	HACİM (m3) DOLMA	KÜMÜLATİF HACİM (m3) YARMA	KÜMÜLATİF HACİM (m3) DOLMA	BRÜCKNER DEĞERİ
	0.00			-	-	-	-	
0+080.00	20.00	222.736	-	4640.170	-	4640.170	-	+4640.170
0+100.00	20.00	333.281	-	5672.890	-	10313.060	-	+10313.060
0+120.00	20.00	434.005	-	7689.840	-	18002.900	-	+18002.900
0+140.00	20.00	524.976	-	9599.810	-	27602.710	-	+27602.710
0+160.00	20.00	704.947	-	12299.230	-	39901.940	-	+39901.940
0+180.00	20.00	797.140	-	15020.870	-	54922.810	-	+54922.810
0+200.00	20.00	674.504	-	14717.240	-	69640.050	-	+69640.050
0+220.00	20.00	447.731	-	11223.150	-	80863.200	-	+80863.200
0+240.00	20.00	167.264	39.997	6149.960	32.800	87013.160	32.800	+87013.160
0+260.00	20.00	105.433	171.980	2724.970	2119.770	89738.130	2152.570	+89585.560
0+280.00	20.00	69.171	147.032	1746.040	3358.120	91484.170	5510.690	+91331.600
0+300.00	20.00	31.965	88.900	1011.360	2347.320	92495.530	7858.010	+92343.440
0+320.00	20.00	45.993	18.116	1019.580	1070.160	93515.110	8928.170	+93362.540
0+340.00	20.00	197.240	-	2372.330	21.123	95887.440	8949.293	+95734.870
0+360.00	20.00	182.422	-	3796.620	-	99684.060	8949.293	+99531.490
0+380.00	20.00	141.806	2.543	3242.280	0.849	102926.340	8950.142	+102772.770
0+400.00	20.00	59.694	24.092	2018.000	274.340	104944.340	9224.482	+104790.770
0+420.00	20.00	21.503	141.450	811.970	1663.420	105756.310	10887.902	+105602.740
0+440.00	20.00	25.443	418.888	469.460	5600.380	106225.770	16488.282	+106072.200
0+460.00	20.00	151.912	368.570	1773.540	7841.580	107999.310	24329.862	+107845.740
0+480.00	20.00	274.142	341.729	4260.740	7072.990	112260.050	31402.852	+112106.480
0+500.00	20.00	217.996	387.928	4921.570	7296.570	117181.620	38699.422	+117027.050
0+520.00	20.00	189.407	427.005	4064.030	8149.330	121245.650	46848.752	+121091.080
0+540.00	20.00	218.940	441.649	4073.470	8688.540	125319.120	55537.292	+125164.550
0+560.00	20.00	721.599	349.091	9405.390	7906.910	134724.510	63444.202	+134569.940
	20.00			20007.380	4679.050	154731.890	68123.252	+154577.320

Kilometre	Ara Uzaklık (m)	ALAN (m2) YARMA	ALAN (m2) DOLMA	HACİM (m3) YARMA	HACİM (m3) DOLMA	KÜMÜLATİF HACİM (m3) YARMA	KÜMÜLATİF HACİM (m3) DOLMA	BRÜCKNER DEĞERİ
0+580.00		1279.143	318.878			149051.410	70378.902	+78672.508
	20.00			27489.900	7297.280			
0+600.00		1469.787	410.850			176540.710	77676.182	+98864.528
	20.00			28984.050	8189.460			
0+620.00		1430.618	400.096			205524.760	85865.642	+119659.118
	20.00			27949.520	8912.030			
0+640.00		1367.734	489.107			233488.280	94777.672	+138710.608
	20.00			26355.430	9361.240			
0+660.00		1247.809	453.017			259843.710	104138.912	+155704.798
	20.00			26202.520	10026.030			
0+680.00		1282.443	549.586			286046.230	114164.942	+170881.288
	20.00			22883.550	9896.340			
0+700.00		1035.912	440.048			307929.780	124061.282	+183868.498
	20.00			18320.660	6904.520			
0+720.00		796.164	280.404			326250.440	130965.802	+195284.638
	20.00			10711.240	5164.300			
0+740.00		274.972	66.024			336961.700	136130.102	+200831.598

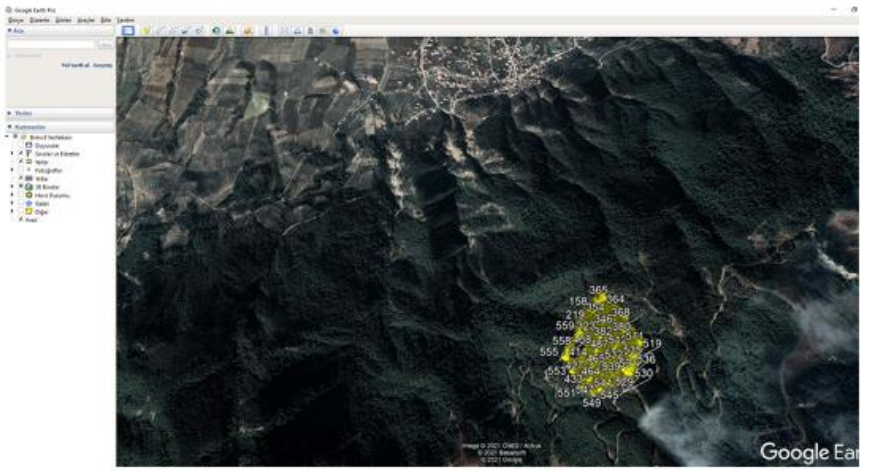
3.1.3 Çağşak Kübaj Hesabı

1/ 25000 lik haritalar kullanılarak eş yükselti eğrili haritadan sayısal arazi modeli (SAM) üretilmiştir (Şekil 3). SAM üretiminde kullanılan teknikler arazi topoğrafyasını bilgisayar ortamında modellemektedir. Bu çalışmada SAM üretimi aşamasında üçgenleme metodu kullanılmıştır. SAM bilgilerine göre en düşük arazi kotu 736m, en yüksek arazi kotu772 m ve ortalama yükseltisi ise 754 m'dir.



Şekil-6 Çağşak SAM modeli

Son durum için ise Google earth kullanılarak kotlar alınıp eğri geçirilip üçgenleme yapılarak son durum SAM üretilmiştir.(Şekil-7)



Şekil-7 Çağşak Google earth kulanılarak hazırlanan kulanım sonrası arazi modeli

Uygulamada enkesit aralığı 20 m olmak üzere bilgisayar ortamında otomatik olarak tespit edilmiş olan 12 adet enkesit için, toplam kazı hacmi 0m3, toplam dolgu hacmi 137111.660m3, net hacim ise -137111.660m3m3 (0m3-137111.660m3=-137111.660m3) olarak hesaplanmıştır.(Tablo-4)

Tablo-4 Çağşak Kübaj Hesabı

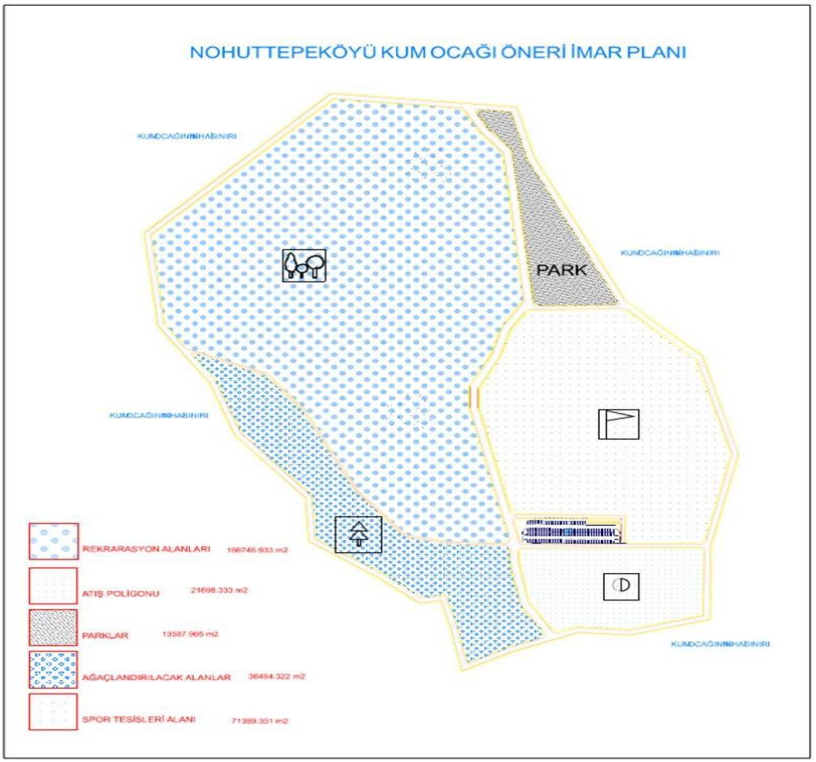
Kilometre	Ara Uzaklık (m)	ALAN (m2)		HACİM (m3)		KÜMÜLATİF HACİM (m3)		BRÜKNER DEĞERİ
		YARMA	DOLMA	YARMA	DOLMA	YARMA	DOLMA	
	0.00			-	-			
0+040.00		-	661.608			-	-	+0.000
	20.00			-	13247.760			
0+060.00		-	663.168			-	13247.760	-13247.760
	20.00			-	16420.940			
0+080.00		-	978.926			-	29668.700	-29668.700
	20.00			-	17154.840			
0+100.00		-	736.558			-	46823.540	-46823.540
	20.00			-	12230.130			
0+120.00		-	486.455			-	59053.670	-59053.670
	20.00			-	8488.510			
0+140.00		-	362.396			-	67542.180	-67542.180
	20.00			-	8308.300			
0+160.00		-	468.434			-	75850.480	-75850.480
	20.00			-	10666.930			
0+180.00		-	598.259			-	86517.410	-86517.410
	20.00			-	12998.170			
0+200.00		-	701.558			-	99515.580	-99515.580
	20.00			-	13821.870			
0+220.00		-	680.629			-	113337.450	-113337.450
	20.00			-	13533.620			
0+240.00		-	672.733			-	126871.070	-126871.070
	20.00			-	10240.590			
0+260.00		-	351.326			-	137111.660	-137111.660

3.2. Öneri İmar Planlarının Hazırlanması

3.2.1 Nohuttepe Öneri İmar Planı

Yapılan kübaj hesapları dikkate alınarak hazırlanan öneri imar planında nohuttepe kum ocağı için Park , yeşil alan ve dinlenme ve eğlence tesisler i, macera alanı, Su sporları alanı, su kenarı rekreasyon alanı, dağcılık ,piknik ve kamp alanı v.s (166746.933 m2).Araştırma ve eğitim ve amaçlı doğa gözlemleme ve koruma alanı, parkur, doğal hayatı izleme ve tanıma alanı, kuş rasat kulesi gibi alanları kapsayan ağaçlandırılacak alan (36494.322 m2). Oyun ve spor alanı kapsayan spor tesisi alanı (71389.351 m2) ve silahlı sporlar için atış poligonu alanı (21698.333 m2) oluşturulabilir. (Öneri İmar Planı - 1)

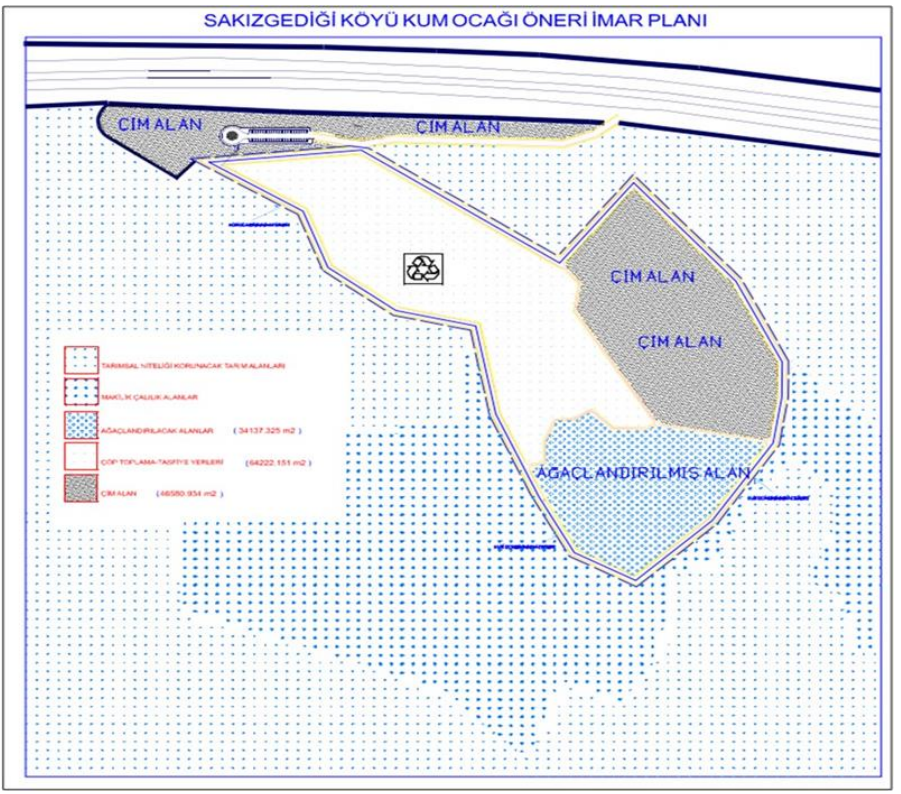
Kübaj hesaplamaları dikkate alınarak hazırlanan önerilen imar planı, Nohuttepe kum ocağı için dinlenme ve dinlenme tesisleri, eğlence rekreasyon alanı ve macera alanı, su ve dağ sporları alanı, su kenarı dinlenme alanı, piknik ve kamp alanı, bitki gösterimini içermektedir. bitki tanımlama amaçlı alan. geniş bir rekreasyon alanı (166746.933 m2). Ağaçlandırılacak alan (36494.322 m2), doğa gözlem alanı, doğa parkuru, yaban hayatı gözlem ve tanıma alanı, doğa koruma, araştırma ve eğitim amaçlı kuş gözetleme kulesi gibi alanları kapsamaktadır. Oyun ve spor alanlarını kapsayan spor tesis alanı (71389.351 m2) ve silahlı sporlara yönelik atış poligonu alanı (21698.333 m2) oluşturulabilir



Şekil.8. Nohuttepe Öneri İmar Planı

3.2.2 Sakızgediği Öneri İmar Planı

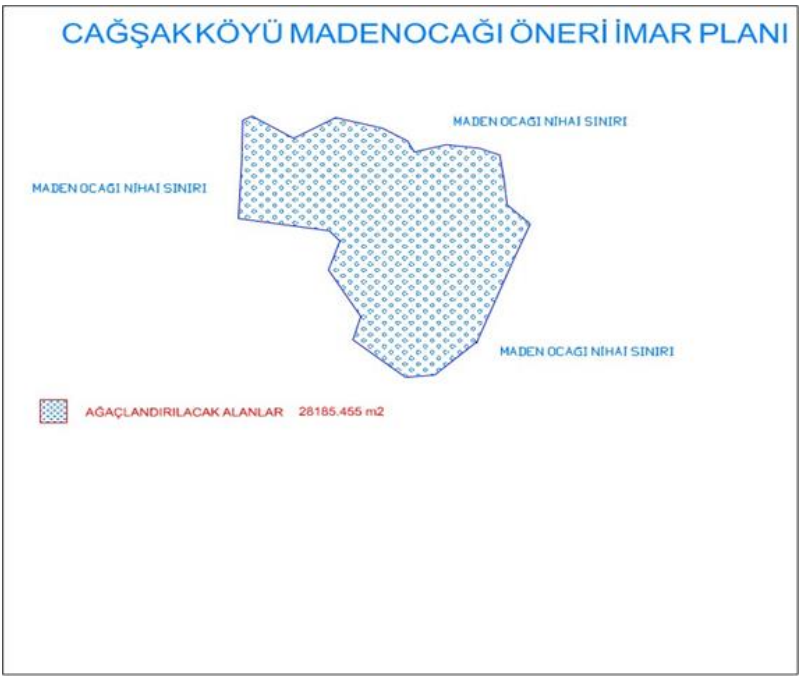
Sakızgediği kum ocağı için kısmen şehirden daha uzak bir noktada bulunduğu ve Adana-Şanlıurfa otoyoluna bağlantı imkanı olduğu için öneri imar planında Çöp Toplama-Tasfiye Yerleri alanı (64222.151 m2). Ekolojik dengeyi yeniden sağlamak için mevcut ekosistemle uygun yeni ormanlık (34137.325 m2) ve çimlik(46580.934) alanlar oluşturulmuştur. (Öneri İmar Planı - 2) Üretimi sona ermiş maden sahalarının yeniden ihyasında bozulmamış yakın çevre doğal peyzajlarının varlığı, bölge peyzajının göstergesi olması bakımından çok önemlidir.



Şekil 9. Sakızgediği Öneri İmar Planı

3.2.3 Çağşak Öneri İmar Planı

Çağşak maden ocağı Alanı orman sayılan alandadır.. Şimdiki arazi kullanımı maden çıkarma çalışmalarından önce alan koru ormanı olarak işletilmiştir. Çağşak maden ocağının maden çıkarma çalışmaları öncesi kullanım şeklinin orman alanı olması dolayısıyla, orman olarak kullanılması daha uygun olacaktır. Bu durumda doğal ekosistemi yeniden canlanacak, gördüğü fonksiyonlar ve ekonomik açıdan kıymetlenecektir. Bu yüzden öneri imar planında tüm maden sahası tekrardan ağaçlandırılacak alan (28185.455 m2) olarak belirlenmiştir. (Öneri İmar Planı - 3)



Şekil 10 . Çağşak Öneri İmar Planı

3.3. Arazi Planlaması Konusunda Değerlendirme

Araştırmam, hem eski hem de yeni her taş ocağı için bir kazı sonrası planın uygulanması gerektiğinin farkına işaret ediyor. Toplum, çok sayıda endüstriyel sürecimiz için gerekli olan malzemeleri teslim etmeden taş ocakçılığını durduramaz, ancak taş ocaklarını artık çalışır durumda değilken terk edersek, araziyi boşa harcar, şehirleri kirletir ve doğal yaşam alanlarının bozulmasına izin veririz. Taş ocaklarının sonradan kullanılması, taş ocakçılığının halk tarafından kabulünü arttırdığı ve eski taş ocağı sahalarının sadece bozulmuş alanlar olmadığını, araziye katma değer sağlayabildiğini ve hatta bir bölgenin kalkınması için bir katalizör görevi görebileceğini gösterdiği için önemlidir. Osmaniye'ye ait Arazi rehabilitasyonu, taş ocakçılığının önemli bir parçasıdır ve bozuk alanları yeni sürdürülebilir arazi kullanımlarına uygun hale getirmeyi amaçlar ve bu tür uygulamaların norm olmaması hayal

kırıklığı yaratıyor. Taş ocaklarının rehabilitasyonu o kadar çok olumlu sosyal, ekonomik ve çevresel sonuç verebilir ki, ancak kaynakları tükendikten sonra topluma yeniden kazandırılmaları mantıklıdır. İyileştirme, çoğu taş ocağı sahası için maliyetli bir başarı olsa da, sunduğum ocaklarda görülen faydalar, faydaların maliyetlerin nasıl ağır basacağını ve şehirlerimizi ekolojik olarak daha sağlıklı ve estetik olarak daha hoş hale getirmek için önlemler olarak uyarlanabilir yeniden kullanımın üstlenilmesi gerektiğini gösteriyor. Taş ocağı işleten ve bu alanı kullanacak kişilerin bilinçlendirilmesi ve resmi gazetede yayımlanan "Madencilik Faaliyetlerinden Zarar Gören Arazilerin Yeniden Kazandırılmasına Dair Yönetmelik" maddelerinin uygulanması için gerekli kontrol tedbirlerinin alınması gerekmektedir. Bu çalışma ile yenilenebilir yeşil bir doğa ve yaşam ortamı düzenlenmelidir.

(Cındık & Acar, 2010)

Taş ocağı işleten ve bu alanı kullanacak kişilerin bilinçlendirilmesi ve resmi gazetede yayımlanan "Madencilik Faaliyetlerinden Zarar Gören Arazilerin Yeniden Kazandırılmasına Dair Yönetmelik" maddelerinin uygulanması için gerekli kontrol tedbirlerinin alınması gerekmektedir. Bu çalışma ile yenilenebilir yeşil bir doğa ve yaşam ortamı düzenlenmelidir.

4.Bulgular ve Tartışma

İmar planları şehrin daha planlı gelişmesi ve şehirde yaşayan hemşehriler için daha iyi bir yaşam kalitesi sunmak için yapılmaktadır. Bu amaçla plan yapılırken şehrin ve şehirde yaşayan nüfusun iyi araştırılarak analiz edilmesi gerekir. Şehrin 20 yıllık geleceğini planlayan nazım imar planı ve bu planın uygulamasını gösteren uygulama imar planı arazi kullanım , koruma eve kısıtlama kararları içerir.

Taş ocaklarının işletme faliyetini yitirmesi sonucu yapılan kübaj hesapları sonrası toplam kazı hacmi toplam dolgu hacmi net olarak hesaplanmıştır. Bu bulgular sonucunda kamu ve özel sektörde ihtiyaçlar düşünülerek değerlendirme sonucu

belirlenen taş ocakları için doğa koruma rekreasyon alanı , , eğitim ve araştırma amaçlı doğa rasat alanı , doğa yürüyüş alanı ,ve çoğunlukla eski haline döndürme amaçlı ağaçlandırma alanı, oyun ve spor alanı, atış poligonu ve çöp toplama tasfiye yerleri yada yenilene bilir enerji için güneş enerjisi santralleri düşünülebilir.

Nohuttepe köyü öneri planı imar planı için Cevdetiye belde belediyesi sınırlarında kaldığı için imar değişiklikleri ilgili belediyeye sunulmalıdır. Çevre düzeli planı ve nazım imar planındaki duruma bakılarak eğer uygunsa yapılan plan belediye meclisinde onaylanmasından sonra 30 günlük askıya çıkarılarak kesinleşir.Çevre düzeni planına uygun değilse revizyon yapılarak planma işlemi yapılmalıdır.Bu çalışmadaki öneri planlar yapılırken şehir plancısından destek alınmıştır.Ancak uygulama esnasında planma çalışması şehir plancısı tarafından yapılmalıdır.

Ülkemizin de yaşanan 6 Şubat K. Maraş depremlerinden Osmaniye ilide çok etkilenmiştir. AFAD'tan alınan verilere göre 2023 Kahramanmaraş depremlerin de orta hasarlı konut sayısı 2.196, ağır hasarlı bina sayısı 7.979, acil yıkılması gereken bina sayısı 2.105 ve depremde yıkılan toplam bina sayısı 970 olarak tespit edilmiştir. (Osmaniye AFAD İl Müdürlüğü, 2023).Bu on binden fazla binanın yıkılması ve bu yıkıntıların boş bir alana taşınması anlamına gelmektedir.Bu alan Osmaniye gibi tarım bölgesi olan bir şehirde yeni tarım alanlarının işgalini ve tahribine yol açacaktır. İşte Nohuttepe köyündeki taş ve malzeme ocağı depremde bu amaçla kullanılmış binlerce ton atık inşaat malzemesi bu alana taşınmıştır.

30 günlük askıdan sonra kesinleşen imar planına göre parselasyon haritası hazırlanıp atış poligonu ve spor alanı yada ağaçlandırılacak alan gibi arazi kullanım kararları ilgili kurumlara tahsis yapılarak uygulamaya geçirilir. Örneğin nohuttepe köyünde 102 ada 7,14,15 ve 131 nolu parsellerin bir kısım arazi de il spor müdürlüğüne tahsisle atış poligonu yapılmıştır.

Şekil 11. Nohuttepe köyü taş ocağının kadastral durumu ve atış poligonu tesisi

4. Sonuç ve Öneriler:

Açık maden ocakaları(kum ocağı,mermer ocağı) toplumun ihtiyacı olan yol, mermer, beton ve bunun gibi gereksinimler için zorunlu bir faaliyet alanıdır. Ancak bu maden ocakları doğal tepeleri yok etmekte tabiatta büyük defermasyonlar yaparak derin çukurlar oluşturmaktadır. Bu alanlar rehabilite edilerek toplumun ve kamu yönetiminin ihtiyaç duyduğu mekanlar haline getirilebilir.

Bu çalışmada Osmaniye ilinde bulunan 3 adet açık maden ocağı incelenmiş ve önceki ve güncel haritalar kullanılarak doğadaki tahribat miktarı hesaplanmış ve güncel duruma göre yapılabilecek rehabilitasyon planlaması önerilerinde bulunulmuştur. Özellikle kamu kurumlarının ihtiyaç duyduğu arazi yatırımları bu alanlardan faydalanılarak değerlendirilebilir. Bu kapsamda atıcılık alanı,geri dönüşüm merkezi,spor tesisi,ağaçlandırılacak alan,ve rekrarasyon alanı gibi arazi kullanım planları yapılan çalışma bölgesinde önerilmiştir.

Ayrıca tahsis edilen kurumlar tarafından imar planı yapılmadan da bu parseller üzerinde çeşitli kamu tesisleri yapılmıştır.Nohuttepe köyünde İl spor müdürlüğü tarafından atış poligonu yapılmış ve sakızgediğinde ise geri dönüşüm tesisi yapılmıştır.Deprem gibi afetlerde acil kaldırılması gereken inşaat artıkları içinde bu alanlar depolama alanı olarak kullanılmıştır. Her ne kadar da rehabilite mantığına uymasa da yeni alanların inşaat molozlarıyla tahrip edilmesi bu sayede önüne geçilmiştir.Rehabitasyon amaçlı bu alanlar genelde orman içinde olduğu için ağaçlandırma yapılması en uygun çözümdür. Bu amaçla bu bölgeler fidan dikim alanı olarak tüm kurumlara ve sivil toplum kuruluşlarına bildirilmeli ve kampanyalarla hızlıca yeşillendirilmelidir.

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BÖLÜM II

Balıkesir - Manyas – Akçaova Köyü Toplulaştırma Projesi Teknik Analizi

Ömer ACAR[1]

Giriş

Dünya genelinde giderek artan nüfus gıda ihtiyacı ile birlikte (Kızılelma vd., 2013; Denizdurduran vd., 2017), gıda güvencesi sağlama zorunluluğunu beraberinde getirirken, bu ihtiyacın karşılanması mevcut tarım alanlarının daha etkin ve sürdürülebilir bir şekilde kullanılmasını gerektiriyor (Asiama vd., 2021; Ntihinyurwa ve Vries, 2021). Bu bağlamda, arazi toplulaştırma projeleri, tarım sektöründe önemli bir dönüşüm aracı olarak öne çıkıyor (Djanibekov vd., 2012; Chen vd., 2018).

Arazi toplulaştırması, verimsiz kullanılan veya kullanılmayan arazilerin düzenlenmesini ve üretim ile arazi kullanım verimliliğinin artırılmasına yönelik faaliyetleri ifade eder (Moravcová vd., 2017;

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Shi vd., 2018). Arazi toplulaştırma ile temelde çeşitli sebeplerle küçülen ve dağınık halde bulunan tarım arazilerinin birleştirilerek büyük parsellere dönüştürülmesi amaçlanmaktadır (Bengin ve Acar, 2018; Sağlam, 2022). Bunun sonucu olarak üretim maliyetleri düşmekte, birim alanda elde edilecek ürün miktarı artmakta (Ayrancı, 2004; Yağanoğlu vd., 2018) ve modern tarım esaslarına uygun hale getirilmektedir (Tunalı vd., 2016; Kuzu vd., 2018). Birçok ülkede yaygın olarak uygulanan bu yöntem, tarım ve üretim alanlarında etkili bir arazi yönetim stratejisi olarak görülmektedir (van den Brink ve Molema, 2008; Shi vd., 2018).

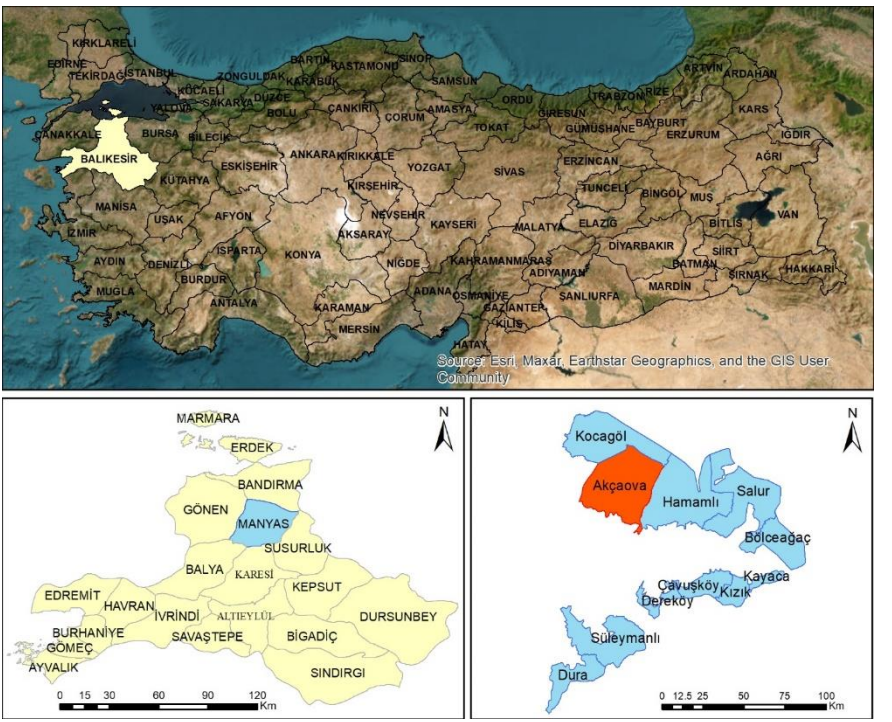
Arazi toplulaştırma projeleri sürdürülebilir tarım (Long vd., 2010), kırsal kalkınma (Acar ve Bengin, 2018; Yurui vd., 2019; Jiang vd., 2022), sürdürülebilir arazi yönetimi (Cheng vd., 2021), biyolojik çeşitliliğin korunması (Johansen vd., 2018), çevrenin korunması (Sun vd. 2021) gibi çok fazla hedefi olan işlevli bir uygulamaya dönüşmüştür. Tarım alanlarını daha verimli ve sürdürülebilir hale getirerek çiftçilere ekonomik faydalar sağlamakta (Asimeh vd., 2020; Kuburić vd., 2022), kırsal bölgelerde yaşayanların sosyal ve ekonomik kalkınmasına katkıda bulunmaktadır (Dudzińska vd., 2018; Long vd., 2019). Sürdürülebilir arazi yönetimi ilkeleriyle ilişkilendirdiğimizde toprak erozyonuyla mücadele, su kaynaklarının etkin kullanımı ve tarımın çevresel etkilerini azaltma gibi önemli hedefleri içermektedir (Pijanowski vd., 2022). Biyolojik çeşitliliğin korunması açısından baktığımızda doğal yaşam alanlarını ve ekosistemi koruma amacıyla planlanmakta ve uygulanmaktadır (Moyzeová ve Kenderessy, 2015).

Bir çok hedefi içerisinde barındıran arazi toplulaştırma çalışmaları uzun zaman ve emek almakla birlikte yüksek maliyetli olması nedeniyle sağladığı faydaların tespit edilmesi gerekmektedir. Bu bağlamda uygulama sonrasında projelerin teknik analizlerinin yapılması ve başarı oranının tespit edilmesi büyük önem arz etmektedir (Akdeniz ve Acar, 2023). 1961 yılında başlayan toplulaştırma çalışmaları 2022 yılına kadar toplamda 8,78 milyon hektar alanda tamamlanmış, 2023 sonunda 9,20 milyon hektar

alanda tamamlanacağı tahmin edilmektedir (12. Kalkınma Planı,2023).

Çalışma Alanı

Çalışma alanı olarak Balıkesir İli Manyas İlçesi Akçaova Köyü sınırlarında yer almaktadır (Şekil 1). Manyas Ovası Sol Sahil Sulaması ve Bereketli Pompaj Sulamaları A.T. ve T.İ.G.H. Projesi kapsamında Manyas ilçesinde 11 köy yer almakta ve toplam alanı yaklaşık 6300 hektar alandan oluşmaktadır. Çalışma alanı olarak belirlenen Akçaova Köyü 1200 hektar yüzölçümü ile düzenleme kapsamındaki en büyük köylerden birisidir. Akçaova Köyü Manyas İlçe merkezine 15 km, Balıkesir İl merkezine 70 km uzaklıkta yer almaktadır. Köy halkının geçim kaynağı tarım ve hayvancılıktır. Çiftçiler ağırlıklı olarak buğday, ayçiçeği ve mısır yetiştirmektedir.



Şekil 1. Akçaova Köyü Lokasyon Haritası

Materyal Metod

Balıkesir'de yapılan arazi toplulaştırma ve tarla içi geliştirme hizmetleri Tarım ve Orman Bakanlığı Devlet Su İşleri Genel Müdürlüğü 25. Bölge Müdürlüğü tarafından yürütülmektedir. Çalışma alanında proje verileri 25. Bölge Müdürlüğü'nden temin edilmiştir. Toplulaştırma öncesi (kadastral durum) ve toplulaştırma sonrası (parselasyon planı) LiTop yazılımı kullanılarak analizler yapılmıştır. Analiz sonuçlarına göre haritaların oluşturulmasında Netcad 8.5, LiCad ve ArcGIS yazılımları kullanılmıştır. Düzenleme kapsamında toplulaştırma öncesi ve sonrası parsellerin şekilleri, yola cephesinin olması/olmaması, mülkiyet durumu, ortalama arazi büyüklüğü, parsellerin toplam çevre uzunlukları, proje sahasındaki kesinti oranı ve toplulaştırma oranı incelenecektir.

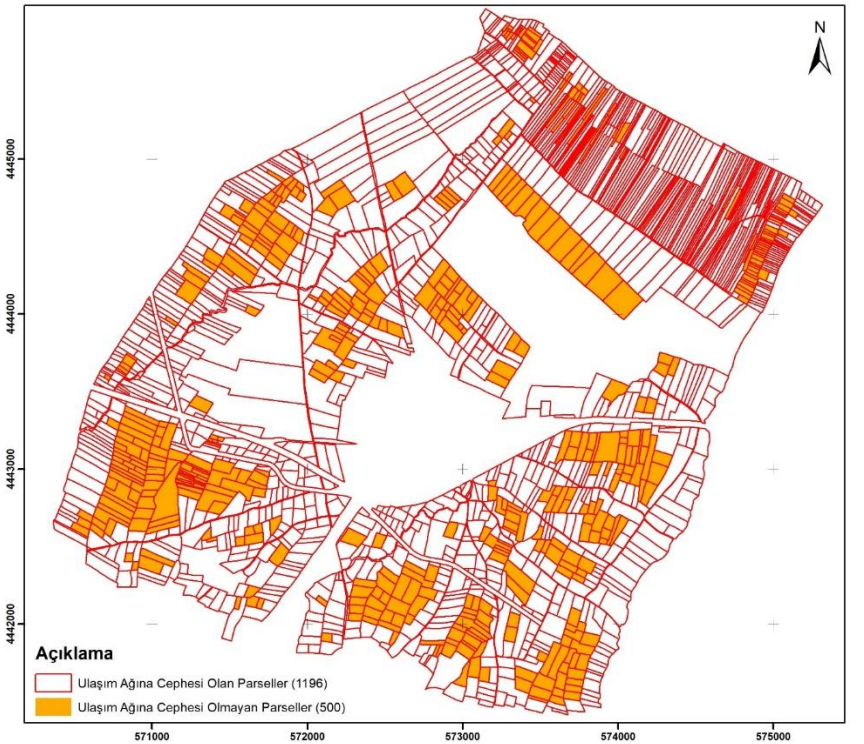
Bulgular ve Tartışma

Tarımsal üretimin yapıldığı kırsal alanlarda mekanizasyon açısından parsel şekilleri önemli kriterlerden birisidir. Yapılan araştırma sonuçlarına göre tarımsal mekanizasyon için uygun olan şeklin dikdörtgen olduğu ve en boy oranının ise 1/3 ile 1/7 arasında olması gerektiği belirlenmiştir (Yağanoğlu vd., 1994; Nimetoğlu, 2013; Akkaya Aslan, 2018). Tarımsal mekanizasyon için parselin geometrik şeklinde belirlenen uygunluk sıralaması dikdörtgenden sonra yamuk ve bozuk şekilli (şekilsiz) parseller yer alırken üçgen şekilli parseller en sonda yer almaktadır (Gündoğdu vd., 2017). Akçaova Köyü'nde arazi toplulaştırma projesi ile geometrik şekillerde yapılan değişiklikler incelendiğinde en uygun şekil olarak ifade edilen dikdörtgen oransal olarak % 6,23 artmış, uygunluk sıralamasında sonda yer alan üçgen şekli ise % 6,57azalmıştır (Tablo 1).

Tablo 1. Akçaova Köyü Parsel Şekil Analizi

Şekil Adı	Proje Öncesi		Proje Sonrası	
	Adet	**%**	**Adet**	**%**
Üçgen	165	9.73	30	3.16
Kare	21	1.24	27	2.85
Dikdörtgen	636	37.50	415	43.73
Yamuk	615	36.26	344	36.25
Şekilsiz	259	15.27	133	14.01
Toplam	1 696	100.00	949	100.00

Kırsal alanlarda ulaşım ağına (yola) cephesi olmayan parsellere diğer parseller üzerinden geçerek ulaşımını sağlamaktadır. Her ne kadar ulaşımı sağlasa da geçiş sağladığı parselde yol olarak kullandığı alan tarımsal amaçlı kullanılmamakla birlikte hak sahibi kişi ile sorunlara yol açabilmekte ve sosyal huzurun bozulmasına sebep olmaktadır (Küsek, 2014). Akçaova Köyü'nde proje öncesi ulaşım ağına cephesi olan/olmayan parseller incelendiğinde 500 parselin ulaşım ağına doğrudan bağlantısı yoktur (Şekil 2).



Şekil 2. Akçaova Köyü Ulaşım Ağı Haritası

Akçaova Köyü'nde yer alan parsellerin mülkiyet durumları incelendiğinde şahıs, hazine ve mera arazilerinden oluşmaktadır. Şahıs arazilerinde toplulaştırma işlemine uygun olarak aynı kişi yada aileye ait araziler çiftçinin talebi doğrultusunda birleştirilmiştir. Proje öncesinde 1682 parsel olan şahıs arazisi proje sonrasında 925 parsel ile tescil işlemleri gerçekleştirilmiştir. Mera arazisi yapılan blok planlaması neticesinde 2 parçaya bölünmüştür (Tablo 2).

Tablo 2. Akçaova Köyü Mülkiyet Durumu

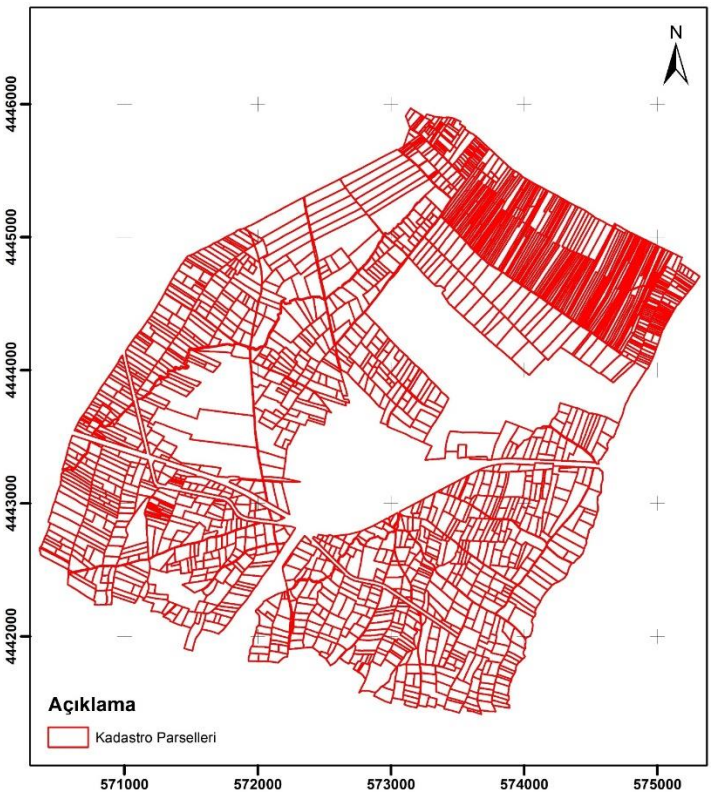
Mülkiyet Şekilleri	Proje Öncesi			Proje Sonrası		
	Sayısı	Alan (Dekar)	Oran (%)	Sayısı	Alan (Dekar)	Oran (%)
Şahıs Arazileri	1682	10863.97	90.63	925	9971.73	89.89
Hazine Arazileri	13	15.55	0.13	22	15.18	0.14
Mera Arazileri	1	1108.02	9.24	2	1106.49	9.97
Toplam	1696	11987.54	100.00	949	11093.40	100.00

Türkiye'de 2016 yılında TUİK tarafından yapılan tarımsal işletme yapı araştırmasına göre tarım arazilerinin ortalama büyüklüğünün 12,90 dekar olarak belirtilmiştir (TUİK, 2018). Akçaova Köyü'nde proje öncesi ortalama parsel büyüklüğü 7,07 dekar iken proje sonrasında 11.69 dekar olmuştur. Türkiye ortalamasına göre küçük olsa da ortalama parsel büyüklüğünde ciddi derecede artış sağlanmıştır. Parsel gruplarına göre baktığımızda proje öncesi ağırlık 0-5 dekar aralığındayken proje sonrasında 0-5 dekar aralığında büyük oranda azalma olduğu tespit edilmiştir (Tablo 3).

Tablo 3. Akçaova Köyü Parsel Büyüklüğüne Göre Dağılımı

Parsel Grupları (Da)	Proje Öncesi		Proje Sonrası	
	Parsel Sayısı	Ortalama Parsel Büyüklüğü (da)	Parsel Sayısı	Ortalama Parsel Büyüklüğü (da)
0 - 5	1055	3.01	380	3.35
6 - 10	431	7.95	274	8.28
11 - 20	161	14.55	189	15.03
21 - 50	41	27.32	87	28.01
51 - 100	4	66.97	15	62.09
101 - 500	3	180.86	3	122.59
501 - 1000	0	0.00	1	976.05
1000 >	1	1108.02	0	0.00
Toplam	1696	7.07	949	11.69

Düzenleme sahasında proje öncesi parsellerin çevre uzunlukları hesaplandığında toplam 690786 m olmaktadır (Şekil 3). Proje sonrası hazırlanan parselasyon planına göre parsellerin toplam çevre uzunlukları 434644 m olmuştur (Şekil 4). Tarımsal üretim için kullanılan makinaların araziyi işlemesinde parsel sınırlarına yaklaşmasından dolayı işlenemeyen alan oluşmakta ve ortalama 0,5 m kabul edilmektedir (Akdeniz ve Temizel, 2018). Bu kapsamda yapılan hesaplama ile proje öncesi yaklaşık 345 dekar, proje sonrasında ise yaklaşık 217 dekar arazi tarımsal olarak kullanılamamaktadır. Parsellerin çevre uzunlukları sebebiyle proje öncesi ve sonrası karşılaştırma yapıldığında yaklaşık olarak 128 dekar arazi tarıma kazandırılmıştır.



Şekil 3. Akçaova Köyü Kadastral Durum (Proje Öncesi)

Şekil 4. Akçaova Parselasyon Planı (Proje Sonrası)

Akçaova Köyü'nde yapılan arazi toplulaştırma projesinde 1696 parsel düzenlemeye dahil edilmiştir. Proje sahasında yapılan çalışmalar sonucunda proje sonrası 949 parsel oluşturularak tescil işlemleri gerçekleştirilmiştir. Proje sahasında hesaplanan toplulaştırma oranı % 44,04 olarak hesaplanmıştır. Yapılan araştırmalara göre Türkiye'de yapılan arazi toplulaştırma

projelerinde elde edilen ortalama toplulaştırma oranı %42,40 olarak hesaplanmıştır (Dağdelen vd., 2017).

Toplulaştırma projelerinde sulama, tahliye kanalları ve proje ile açılacak yeni yollar ortak tesis olarak kabul edilmektedir. Ortak tesisler için ayrılan alanları oluşturmak için düzenleme sahasında bulunan parsellerden mevzuata göre %10'a kadar bedelsiz kesinti yapılabilmektedir. Çalışma alanında uygulanan kesinti oranı %8,26 olarak hesaplanmış ve mera arazisi dışında tüm parsellerden bu oranda kesinti yapılmıştır. Akçaova Köyü'nde yapılan arazi toplulaştırma projesi 5403 sayılı kanuna göre yapılmıştır. 5403 sayılı kanun kapsamında yapılan projelerde mera, çayır ve otlaklardan kesinti yapılmamakta ve bu sebeple kesinti oranı yaklaşık % 1 oranında fazla çıkmaktadır.

Sonuç

Balıkesir'de yapılan ve hala devam etmekte olan Manyas Ovası Sol Sahil Sulaması ve Bereketli Pompaj Sulamaları A.T. ve T.İ.G.H. Projesi'nde yer alan Akçaova Köyü arazi toplulaştırma projesi değerlendirilmiştir. Çalışma alanında yapılan analizler sonucunda parsel şekillerine göre proje öncesi dikdörtgen parsel sayısı ile yamuk parsel sayısı ağırlıkta yer alırken proje sonrasında dikdörtgen parsel şekli ağırlıkta planlaması yapılmıştır. Üçgen parsel sayısı ciddi oranda azalmıştır. Parsel şekillerinde yapılan düzeltmelerin tam anlamıyla yapılamaması proje sahasında yer alan sabit tesislerin korunması ve arazi yapısına göre hazırlanan blok planlarından kaynaklanmaktadır.

Çalışma alanında proje öncesinde 500 parsel ulaşım ağından faydalanamazken proje sonrasında tüm parsellerin ulaşım ağına cephesi olacak şekilde planlaması yapılmıştır. Bunun yanı sıra düzenleme öncesi tarımsal faaliyetlerinde çiftçi kendi imkanları ile sulamasını yaparken proje ile birlikte sulama ve tahliye sistemleri planlanmış ve proje sonrasında tüm parsellerin sulama ve tahliye sistemlerinden doğrudan faydalanacak şekilde planlaması yapılmıştır.

Proje öncesinde ortalama parsel büyüklüğü 7,07 dekar proje sonrasında ise 11,69 dekar olmuştur. Tarımsal ürün yetiştirmede özellikle maliyetin düşürülmesinde önemli bir kriter olan parsel büyüklüğü ortalama 4,62 dekar arttırılmıştır. Proje öncesinde parsel sayısına göre parsellerin alansal yoğunluğu 0-5 dekar aralığında yer alırken proje sonrasında 0-5 dekar aralığındaki yoğunluk yaklaşık %20 azalarak 6-50 dekar aralığına dağılmıştır.

Yapılan düzenleme ile Türkiye ortalaması üzerinde toplulaştırma oranı elde edilmiştir. Uygulama ile birlikte ulaşım ağı, sulama ve tahliye sistemleri için toplamda yaklaşık 900 dekarlık bir alan kullanılarak alt yapı tesisleri güçlendirilmiştir.

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BÖLÜM III

A View On Professional Organisation In Surveying Engineering With Social Network Analysis

Fatih TAKTAK[1]

Introduction

People have always grouped themselves according to their needs. The Turkish Language Institution defines organisation as "an association, formation, or organisation formed by groups or individuals working together to achieve a common goal or work" and symbolises the power arising from unity (TDK, 1932). Particularly in advanced societies with representative government structures, organisations that seek to perform social functions such as running for office are gradually breaking away from the increasingly popular non-governmental organisations (NGOs). It is therefore suspected that rhythmic coordination is the reason for the success that continues to this day (Güçlü, 2003).

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It is shown that with a solid organisation, the quality and productivity of human resources reach new heights. Organisation not only raises individuals' awareness but also enables them to acquire a consciousness and vision that are respectful of the rights of nature and all living beings. In other words, it is trying to provide a way to reach the virtue of living together as modern citizens with the desire for a common life (Sevinç, Tetik & Ercan, 2001; Ouch, 1985; Frost & ark.,1985).

Organisations, of course, do not arise spontaneously and without reason. Organisational capabilities can be said to emerge when the potential to meet a need emerges in the right circumstances with the necessary components. Sometimes organisations inevitably drift with the flow of life. The organisation thus becomes a means beyond the sum of its components to intervene in life and assign an active/transformative role to passive individuals/stakeholders. In this regard, it can be said that a healthy organisation is a process of continuous evolution with the active participation of its constituents, changing, transforming, and recreating itself and its constituents (Schein, 1990; Alvesson, 2011; Lubis & Hanum, 2020; Abu-Jarad, Yusof & Nikbin, 2010).

In Turkey, there are numerous chambers and professional associations organised on a professional basis. The Union of Chambers of Turkish Engineers and Architects (TMMOB) was established in 1954 by Law No. 6235 and founded by engineers and architects. It is regulated as a professional association with public legal personality in Article 135 of the Constitution of the Republic of Turkey. The TMMOB, which originally had 10 chambers and 8,000 members, now has 24 chambers and about 620,000 members. The professional association of the surveying engineering profession is Turkish Chamber of Survey and Cadastre Engineers (HKMO), which is also a member of the TMMOB. This professional association has approximately 19,000+ members. Therefore, the purpose of this study is to assess the views of the Professional Association of Surveying Engineers, which has approximately 20,000 members, about its organisation. An attempt was made to

determine the importance of the professional organisation and the organisational needs of these professionals, the reasons for joining the organisation, and the expectations of the organisation (Cengizhan, 2009; HKMO, 2021; Wikipedia, 2019).

Social Network Analysis Approach

A network is essentially made up of entities called nodes and the connections between those nodes. A social network, on the other hand, can be viewed as a structure composed of actors called nodes and connecting these nodes, depending on relationships and interactions such as friendship, collegiality, or affiliation that take place between them in different ways. By studying and analysing in depth all types of interactions between actors within the social network structure, much clearer and more detailed information can be obtained about the structure in question and the nodes it contains (Riva, 2016; Smith & Christakis, 2008; Milroy & Llamas, 2013). When it comes to social networks, one should think only about communication between people. For example, trade relations, city networks, networks representing relations between organisations, learning networks, etc. are social networks (Brandes, Freeman & Wagner, 2013; Mitchell, 1974).

The most important element of a social network is its users. Users, who may also be referred to as members of the network, are registered with a social network or sometimes can access information without registering. Social networks also contain links that connect these users. These links represent social relationships between users. The social relationships can be of any type: formal or informal, financial, professional, friendly, etc (Turner & Turner, 2013; Gui & Sugden, 2005).

With the social networks approach, it is possible to discover strong ties and qualify the learning environment. It is also possible to discover the structures that contribute to the flow of information in the network, manage the flow of information and new collaborative groups, and generate social capital by promoting trust in the organisation and personal and social development (Carter &

ark., 2015; Carrasco & Miller, 2006). Social networks organise the flow of accessible information, capture knowledge, identify experts, and eliminate misinformation by enabling the "interconnectedness" of knowledge shared by all participants (Milroy, 2013; Demiral, 2020).

The first thing that gave rise to social network theory was ideas from math, physics, and social psychology. Many of the ideas in social network theory come from the math field of graph theory. A graph is a group of points with lines and edges connecting them. In network theory, the points (nodes) represent all types of actors, such as individuals, organisations, countries, etc., as the selected unit of analysis; the lines or arrows (edges, ties) represent the relationships between actors, which are predetermined, defined, and analysed; and the direction of these arrows represents whether the relationships between actors are reciprocal or not. The degree of interconnectedness of actors can be calculated in forms specific to social network analysis, called centrality measures, and draw on highly sophisticated mathematical and physical models (Liu & ark., 2017; Borgatti & Ofem, 2010; Kadushin, 2004). The emergence of many new analysis software (UCINET, Pajek, NodeXL, SIENA, NetMinet, Mathematica, EgoNet, Gephi, Tulip, etc.) in recent years is one of the reasons for the increasing research trend in this field. Advances in information technology have made it easier to analyse larger datasets in more depth and with multiple relationships (Zeynep, 2018; Eren & Kıral, 2018).

Table 1. Social network mechanism measures used for actors (Lusher, Koskinen & Robins, 2013; Wasserman & Faust, 1994)

Social Network Analysis Measurements	**Description and Explanation**
Network Centralisation	The ratio of the number of relationships of an actor with its affiliated actors weighted by the number of relationships of these second actors with other actors.
Density	The ratio of the number of existing ties between actors in a network to the maximum number of possible ties. A higher density ratio, which can take values between 0-1, indicates that the actors in the network are more closely connected.
Degree	The number of direct links with other actors. Degree is defined as the total number of connections between actors within the network.
In-degree	Number of links (inbound links) from other actors to the actor (Number of selections)
Out-degree	Number of connections (outgoing connections) of the actor towards other actors (Selection count)
Closeness	It is a unit of measurement that gives the distance of the distance of the actors in the group. It is the degree to which an actor is directly or indirectly distant from other actors in the network and reflects the actor's ability to access information within the network, how fast it can connect to other actors in the network.
Betweenness	The degree to which the actor in the network is located between (on the paths of) other actors, the bridge.
Eigenvector centrality	The degree of importance of an actor within the network structure.
Clustering Coefficient.	It is a measure of the direct connections of various actors within the network with their neighbours. A higher clustering coefficient, which can take values between 0-1, indicates that the actors within the network are more closely connected.
Clique	A subset of a network consisting of actors connected to each other by direct and strong ties. N-Clique: All actors of a network that can reach each other with n number of ties

Bridge	The bond that connects two actors and which, if removed, would make the two actors disconnected.
Gatekeeper	The only actor connecting the network with the outside world
Isolated	An actor that is not connected to other actors in the network.
Star	The actor with the highest centrality in a group (in the centre of the star).
Structural Gap	A state of disconnection between two independent networks or between two actors and/or groups within the same network.
Centrality Measures	Joint evaluation of degree, Closeness, betweenness and eigenvector centrality

Social Network Analysis (SNA)

It is known that the earliest findings related to SNA can be found in the writings of ancient Greek scholars. The basic development of this field began in the 1930s with studies in various fields that progressed independently (Knoke & Yang, 2019; Freeman, 2004). Originally explored in the fields of psychology, sociology, mathematics, statistics, and computer science, network analysis is now a multidisciplinary research field with a wide range of applications for social scientists, computer scientists, policy makers, economists, sociologists, and mathematicians, among others (Scott, 2012).

The work of American scholar Jacob Moreno, a proponent of the sociogram or diagrammatic map that uses points and lines to represent social relationships, has been adopted as an important starting point for the development of social network analysis (Borgatti, 2010; Walker, 2023). Jacob Moreno's work, which laid the foundation for sociometry, used methods with graphical representations to determine the relationships of individuals or social groups within measurable numerical parameters. By focusing on relationships between individuals rather than individuals, Moreno also developed ideas about social networks or social fabrics that were not previously apparent in his studies (Fredericks & Durland, 2005).

SNA is a method for studying the structure of social relationships that exist between entities and an analytical framework for studying the relationships between social entities (Wasserman & Faust, 1994). It is defined as the study of mapping and measuring relationships between social components in a social network. SNA is based on the assumption of the importance of relationships between interacting groups. Social entities, defined as actors, are represented as nodes on the map. Social relationships influence how people feel based on their experiences, i.e., their subjective lifeworld, and what information or resources they have access to based on those experiences. The advantage of SNA is that it provides the opportunity to identify relationships between people and then examine how they are connected (Tichy, Tushman & Fombrun, 1979; Knoke, 2019).

In social network analysis, there are two basic elements: Actors and Connections. Actors are usually social entities. They can be people in a group, businesses, or public organisations that provide services to a city or country. These social units, called actors, do not necessarily have the will or the ability to act. Actors are bound together by social ties (Wasserman & Faust, 1994). The extent and nature of the ties can vary. The defining characteristic of a tie is that it binds actors together. Examples of ties are bonds of friendship between individuals, bonds of trade between organisations, bonds of communities moving from one place to another, roads connecting two points, bonds forming a formal relationship. In social network analysis, the representation of actors by points and of social relations between these actors by lines is called graph theory in mathematics. A graph is represented by the symbol G. The mathematical representation of a network as a graph is G= (V, E). This graph consists of V (vertices, nodes) and E (edges, links) connecting these nodes. Mathematically, V is the set of nodes and E is the set of links. At least two nodes are required for each graph to be formed (Borgatti vd, 2013). The set of nodes in a graph consisting of n nodes is mathematically called V= {v1, v2, ...vn}. Unlike nodes, a graph does not necessarily have edges. However, to speak of a meaningful

network structure, it is expected that there is an edge between at least two nodes. The set of m edges connecting nodes is called E= {e1, e2..., em}. A graph shows the structure of a network. The total number of nodes in a graph indicates the size of the network. The size of a network is denoted by n or N (Li & ark., 2016; Li & ark., 2017).

Another characteristic used for networks is related to whether they are unimodal or bimodal. The concept of mode is used to represent a set of distinct entities. In a unimodal network, each node represents the set of nodes to which each of the other nodes is connected. In a bimodal network, the nodes are divided into two clusters and the nodes in one cluster are connected to the nodes in the other cluster. In unimodal networks, the number of rows and columns in the prepared neighbourhood matrix must be equal. However, in bimodal networks, the number of rows and columns does not have to be equal (Argan, 2014; Sert, Tüzüntürk & Gürsakal, 2014; Everett & Borgatti, 2013).

When analysing social networks, there are some criteria that must be met to obtain information about the network, find out what it means, and conduct analyses at the actor level. At the actor level of a network, the centrality value of each actor is the most common way to measure how important it is. Centrality is a measure of how important a node is in the network and is a characteristic of the node's location. Depending on the analysis and the situation being evaluated, the centrality of one node may vary compared to another. In this regard, there are different centrality measures in the literature. These different criteria are used to determine the importance of a node. The most used centrality measures are degree centrality, betweenness centrality, closeness centrality, and eigenvector centrality (Borgatti, 2007; Maharani & Gozali, 2014).

Application

In general, the content of the study consists in giving a perspective on the professional organisation of surveying engineers within and outside the institution. The stages of professional

organisation related to surveying engineering in Turkey were discussed by reducing the general to the specific, especially for the professional associations. Then, for the professional associations, the building blocks of these organisations and their goals and organisation and membership systems in general are discussed.

On this topic, an interview study was conducted with surveying engineers working in the public and private sectors, and the results were analysed. The research data were obtained using the interview technique. The population of the study consists of more than 30 people, which includes surveying engineers working in the public and private sectors. The interview consists of 27 questions. The first six questions of the form capture information about the demographic characteristics of the interviewees and their membership in professional organisations, while the remaining 21 questions include questions about the perspective of the professional organisations and the spatial data produced in the institution. In the interview, a 5-point Likert scale of "not at all important, less important, moderately important, very important, very highly in the interview, a 5-point Likert scale of "not at all important, less important, moderately important, very important, very highly important" was used. The numerical analysis values of the data were analysed using Ucinet 6.752, and the visual network maps were analysed using the Gephi 0.9.5 Social Network Analysis programme, using a significance level of 0.05 as the criterion for statistical analyses.

Evaluation of The Interview

The relationship to be uncovered by the interview questions was prepared to uncover the processes of the members of the professional organisation: the reasons for the organisation, the reasons for membership, and the requirements of the organisation. In preparing the questions, examples of questions from Rob Cross and Andrew Parker's (2004) book were considered to elicit information about collaboration, sharing, solidarity, and decision-making processes.

The interview questions were prepared in four different groups: In the first group, "Reasons for the Organisation of Professional Members" questions reveal the reasons for the organisation; in the second group, "Causes for Membership in Professional Organisations?" Questions that reveal reasons for membership; in the third group, "Requirements of Professional Organisations," questions that reveal expectations of organisations; and in the fourth group, ""For which situations is the work you do in your organisation used?" Questions that provide information about the spatial data generated. These questions and their abbreviations are listed in Table 2 below. The abbreviations in Table 2 were used in all social network maps.

Table 2. Interview questions and abbreviations

INTERVIEW QUESTIONS	**Abbreviations**
REASONS FOR THE ORGANISATION OF PROFESSIONAL MEMBERS	
1. Achieve a gain in personal and economic rights	A
2. Contribute to the development of democracy	B
3. Sustainability of professional development	C
4. Strengthening of self-esteem	D
5. Increase the prestige of the profession	E
6. Cooperation between colleagues	F
7. Promotion of professional rights	G
8. Achievement of economic benefits	H
CAUSES FOR MEMBERSHIP IN PROFESSIONAL ORGANISATIONS?	
1. Political ideology of professional organisations	A
2. Actions of professional organisations	B
3. Proximity of professional organisations to the government	C
4. Cooperation between members of professional organisations	D
5. Number of members of professional organisations	E
REQUIREMENTS OF PROFESSIONAL ORGANISATIONS	
1. Valuing the opinions of members of professional organisation members	A
2. Socio-cultural education of members of professional organisations	B

3. Professional organisations have a say in speciality education	C
4. Informing members about the activities of the professional organisation	D
5. The struggle of professional organisations to find solutions to the problems of professional members	E
6. Ensuring cooperation between members of professional organisations	F
7. Organising various scientific activities such as symposia, workshops and seminars through the professional organisations	G
8. Using all their powers and responsibilities in the interest of the public and the state	H
9. Keeping members accurately informed of the latest developments in the profession and of changes in laws and regulations	I
10. Ensuring necessary participation in national and international trade shows, advising members who will be participating in these shows, and providing necessary guidance and support	J
11. Making binding professional decisions that must be followed by professional organisations	K
12. Performing tasks related to the ministry to ensure that the required conditions are met	L
13. Ensuring the development of professional organisations by safeguarding common interests	M

In this study, the evaluations and analyses were performed assuming that participants answered the questions correctly. Assuming that the available data accurately reflect the current situation, conclusions were drawn while recommendations were made.

Figure 1 shows the bimodal network map of the reasons for professional members to organise. Table 3 shows the degree, closeness, betweenness, 2-local, and eigenvector values of the reasons for Professional Members to Organise. The degree of an actor in the network is calculated based on the number of links associated with it. Besides its simple calculation, it is an important measure that can indicate the importance of the actor. The highest and lowest values of degree centrality in the survey are shown in

Table 3 for the institutions. According to Table 3, the degree centrality measures of the actors vary from 0.867 to 0.967. In this study, degree centrality was analysed by examining the total number of direct labour positions and the reasons for organising the different professional members. When examining the degree centrality values of the reasons for organising the professional members in Table 3, it is calculated that the value "A" has the highest degree centrality value. Reasons "B, C, E, and F" have the lowest degree centrality values. Looking at the results of the descriptive statistical analysis of the degree centrality of the actors' reasons for the organisation in relation to the activities they perform from the different professional disciplines, we find that they have an average degree centrality value of 0.338. The highest and lowest Betweenness centrality values in the survey are shown in Table 3 for the professional disciplines. According to Table 3, the betweenness centrality values of the actors vary from 0.066 to 0.106. The table shows that reason "A" has the highest betweenness centrality value compared to the other actors in the network. Some of the actors with the lowest betweenness centrality are reasons "B, C and E". When examining the results of the descriptive statistical analysis of betweenness centrality, we find that the actors have an average betweenness centrality value of 0.08. When examining the closeness centrality values in Table 3, it is calculated that reason "A" has the highest closeness centrality values. The lowest closeness centrality values are for reasons "B, C, E, and F". When examining the results of the descriptive statistical analysis of closeness centrality, it is found that the actors have an average closeness centrality value of 0.869. According to Table 3, the centrality proximity values of the actors vary from 0.83 to 0.936. When examining the network values of the reasons for organising professionals in Table 3, the option "Achieve a gain in personal and economic rights" is one of the prominent options.

Table 3 Degree, closeness, betweenness, 2-Local and eigenvector values of the reasons for professional members to organise.

*Density is the number of ties divided by n*m, where these no. of rows and cols in matrix*

Avg. Dist. is the average geodesic path length in the bipartite graph, within components.

Radius is the smallest eccentricity in the bipartite graph, within components.

Diameter is the length of the longest geodesic in the bipartite graph, within components.

Transitivity is the no. of quadruples with 4 legs divided by no. with 3 or more legs, in bipartite graph.

Norm. Dist. is Avg. Dist. divided into minimum possible in bipartite graph of given node-set sizes.

No	Abbreviations	Degree	2-Local	Closeness	Betweenness	Eigenvector
1	A	0.967	0.904	0.936	0.106	-0.366
2	B	0.867	0.858	0.83	0.063	-0.347
3	C	0.867	0.858	0.83	0.063	-0.347
4	D	0.933	0.892	0.898	0.089	-0.361
5	E	0.867	0.858	0.83	0.063	-0.347
6	F	0.867	0.85	0.83	0.066	-0.344
7	G	0.933	0.892	0.898	0.089	-0.361
8	H	0.933	0.875	0.898	0.098	-0.354

Density	Avg. Dist.	Radius	Diameter	Fragmenta	Transitiv	Norm. Dist.
0.653	1.948	2	4	0.057	0.825	0.952

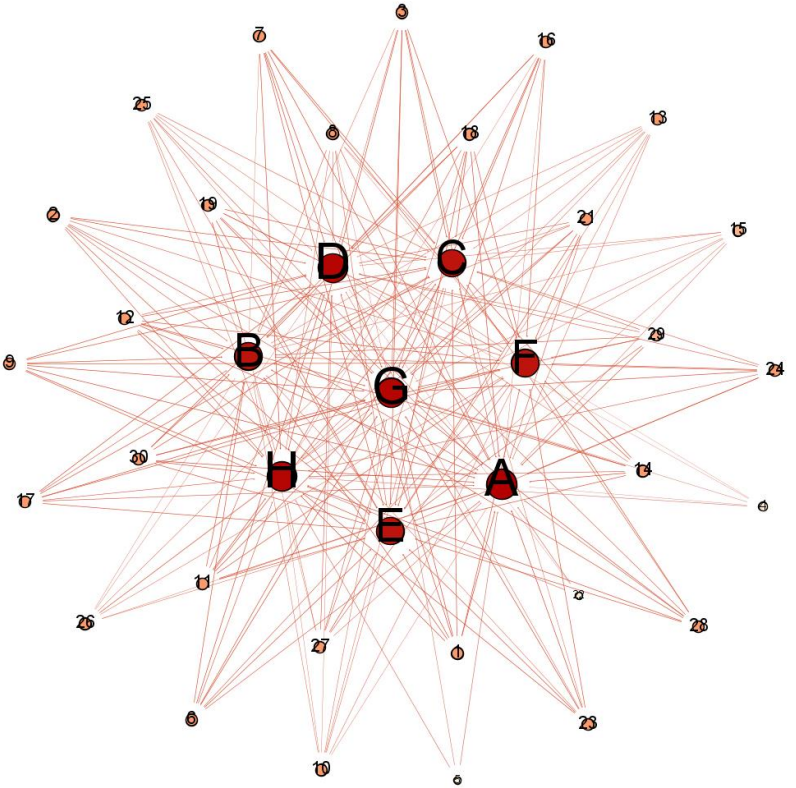

Figure 1. Bimodal network map of reasons for professional members to organise.

Figure 2 shows the bimodal network map of reasons for membership in professional organisations. Table 4 shows the degree, proximity, betweenness, 2-local, and eigenvector values of the reasons for membership in professional associations. The highest and lowest degree centrality values in the survey are shown in Table 4 for the institutions. According to Table 4, the degree centrality measures of the actors vary from 0.4 to 0.9. In this study, degree centrality was analysed by examining the reasons for membership in the direct organisations. When examining the degree centrality values of the reasons for membership in professional organisations

in Table 4, it is calculated that the value "D" has the highest degree centrality values. The lowest degree centrality value is "C". When examining the results of the descriptive statistical analysis of the degree centrality of the actors in relation to the reasons for membership in the organisations, it is found that they have an average degree centrality value of 0.653. The highest and lowest values of Betweenness centrality in the survey are shown in Table 4 for the professional disciplines. According to Table 4, the betweenness centrality values of the actors vary from 0.042 to 0.384. From the table, it can be seen that the reason "D" has the highest betweenness centrality value compared to the other actors in the network. Some of the actors with the lowest betweenness centrality are "C" reason. When examining the results of the descriptive statistical analysis of betweenness centrality are examined, it is seen that the actors have an average betweenness centrality value of 0.167. When analysing the closeness centrality values in Table 4, it is calculated that reason "D" has the highest closeness centrality values. The lowest closeness centrality value belongs to reason "C". When examining the results of the descriptive statistical analysis of closeness centrality, it is found that the actors have an average closeness centrality value of 0.646. According to Table 4, the closeness centrality values of the actors vary from 0.5 to 0.826. When the network values of the reasons for membership in professional organisations in Table 4 are examined, the option "cooperation among members of professional organisations" is one of the prominent options.

Table 4 Degree, closeness, betweenness, 2-Local and eigenvector values of the reasons for being a member of professional organisations.

No	Abbreviations	Degree	2-Local	Closeness	Betweenness	Eigenvector
1	A	0.5	0.44	0.543	0.064	-0.363
2	B	0.767	0.593	0.704	0.187	-0.511
3	C	0.4	0.367	0.5	0.042	-0.297
4	D	0.9	0.62	0.826	0.384	-0.541
5	E	0.7	0.553	0.655	0.156	-0.475

Density	Avg Dist	Radius	Diameter	Fragmenta	Transitiv	Norm Dist
0.985	1.581	2	3	0	0.99	0.992

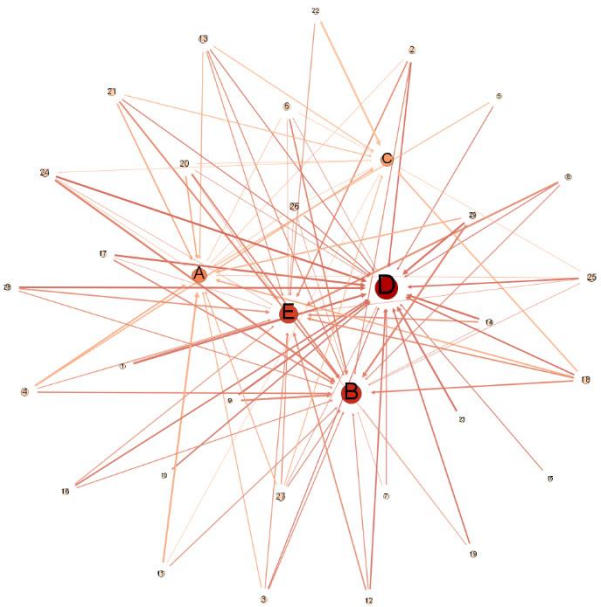

Figure 2. Bimodal network map of reasons for membership of professional organisations

Figure 3 shows the bimodal network map of Requests from Professional Organisation. Table 5 shows the degree, proximity, betweenness, 2-Local and eigenvector values of the requests from Professional Organisation. Table 5 shows the highest and lowest degree centrality of the requests from professional organisation in the questions. According to Table 5, the degree centrality values of the actors vary from 0.967 to 1. In this study, the degree centrality was analysed by examining the requests made directly by the organisation. When examining the degree centrality values of the requests from the professional organisation in Table 5, it is calculated that the values "A, D, E, I, K, L, and M" have the highest degree centrality values. The lowest degree centrality values are "B, C, F, G, H and J". When examining the results of the descriptive statistical analysis of the degree centrality of the actors related to the requests of the professional organisation, we find that they have an average degree centrality value of 0.985. The highest and lowest values of Betweenness centrality in the questionnaire are shown in Table 5 for the professional disciplines. According to Table 5, the betweenness centrality values of the actors vary from 0.037 to 0.042. According to the table it is seen that "A, D, E, I, K, L, and M" have the highest betweenness centrality value compared to the other actors in the network. Some of the actors with the lowest betweenness centrality are "B, C, F, G, H and J". When examining the results of the descriptive statistical analysis of betweenness centrality, we find that the actors have an average betweenness centrality value of 0.04. When examining the closeness centrality values in Table 5, it is calculated that reasons "A, D, E, I, K, L, and M" have the highest closeness centrality values. The lowest closeness centrality value belongs to the requests "B, C, F, G, H and J". Examining the results of the descriptive statistical analysis of closeness centrality, it can be seen that the actors have an average closeness centrality value of 0.983. According to Table 5, the closeness centrality values of the actors vary from 0.964 to 1. When we look at the network values from Table 5 in the section of Requests from the Professional Organisation, it is seen that the option of

"Cooperation among the members of professional organisations" is more prominent.

Table 5. Degree, closeness, betweenness, 2-Local and eigenvector values of requests from the professional organisation

No	Abbreviations	Degree	2-Local	Closeness	Betweenness	Eigenvector
1	A	1	0.985	1	0.042	-0.28
2	B	0.967	0.964	0.964	0.037	-0.274
3	C	0.967	0.964	0.964	0.037	-0.274
4	D	1	0.985	1	0.042	-0.28
5	E	1	0.985	1	0.042	-0.28
6	F	0.967	0.964	0.964	0.037	-0.274
7	G	0.967	0.964	0.964	0.037	-0.274
8	H	0.967	0.954	0.964	0.039	-0.271
9	I	1	0.985	1	0.042	-0.28
10	J	0.967	0.964	0.964	0.037	-0.274
11	K	1	0.985	1	0.042	-0.28
12	L	1	0.985	1	0.042	-0.28
13	M	1	0.985	1	0.042	-0.28

Density	Avg Dist	Radius	Diameter	Fragmenta	Transitiv	Normist
0.904	1.697	2	3	0.053	0.967	1.032

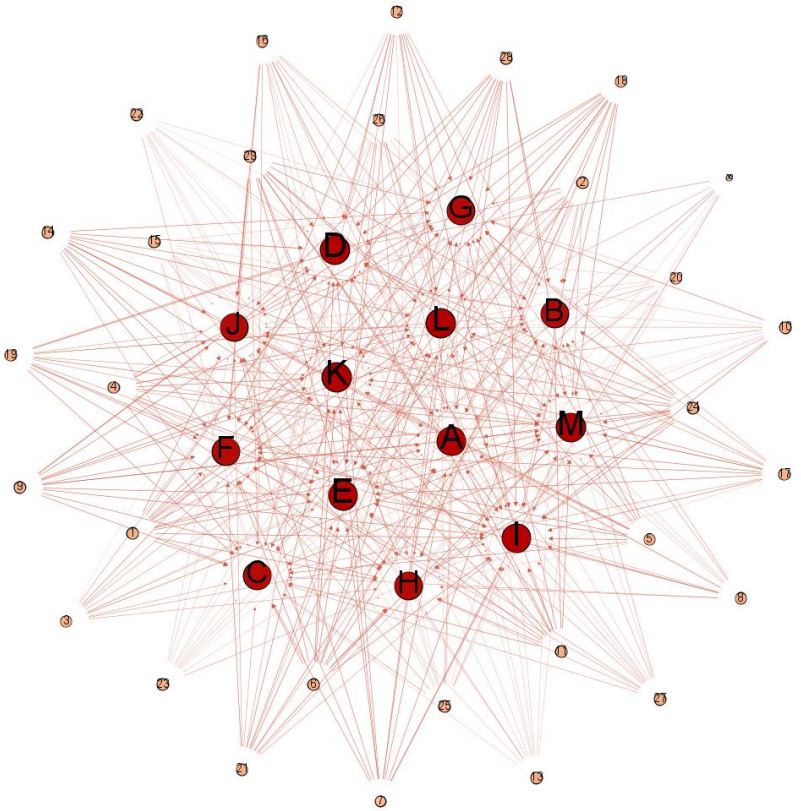

Figure 3. Bimodal network map of requests from professional organisations

Figure 4 shows a bimodal network map of the professional works you do at your institution. No abbreviation was used in this question. Table 6 shows the Degree, closeness, betweenness, 2-Local, and Eigenvector values of the professional work you do at your institution. The highest and lowest degree centrality in the questionnaire is shown in Table 6. According to Table 6, the degree centrality values of the actors vary from 0 to 0.833. In this study, the degree centrality was analysed by directly examining the professional activities performed in the institution. When examining

the degree centrality values of the requests from the professional organisation in Table 6, it is calculated that the job "Map Production" has the highest degree centrality values. The lowest degree centrality value is "slum prevention and Administration of Foundation Immovables". When examining the results of the descriptive statistical analysis of the degree centrality of the actors in the context of their jobs, it is found that they have an average degree centrality value of 0.283. The highest and lowest values of betweenness centrality in the survey are given in Table 6 for the professional activities. According to Table 6, the betweenness centrality values of the actors vary from 0 to 0.221. The table shows that the "Map Production " has the highest centrality value compared to the other actors in the network. Some of the actors with the lowest betweenness centrality include "Administration of Historical Assets, Slum Prevention and Administration of Foundation Immovables" The results of the descriptive statistical analysis of betweenness centrality show that the actors have an average betweenness centrality value of 0.039. When examining the closeness centrality values in Table 6, it is calculated that the job "Map Production" has the highest closeness centrality values. The lowest closeness centrality value is "Slum Prevention and Administration of Foundation Immovables". Examining the results of the descriptive statistical analysis of closeness centrality, it is seen that the actors have an average closeness centrality value of 0.552. According to Table 6, the closeness centrality values of the actors vary from 0 to 0.81. Looking at the network values from Table 5 for the Professional works You Do in Your Organisation, it is seen that the "Map Production" option is the most prominent response. The least interested jobs are "slum prevention" and "administration of foundation immovables".

Table 6. Degree, closeness, betweenness, 2-Local and eigenvector values of the professional works you do in your organisation.

No	Spatial Data	Degree	2-Local	Closeness	Betweennss	Eigenvector
1	Map Production	0.833	0.273	0.81	0.221	-0.471
2	Expropriation	0.467	0.172	0.642	0.051	-0.288
3	Environment and Soil Conservation	0.067	0.027	0.472	0.001	-0.036
4	Real estate valuation	0.133	0.063	0.5	0.002	-0.103
5	Planning	0.533	0.202	0.667	0.067	-0.339
6	Infrastructure Services	0.367	0.135	0.607	0.068	-0.216
7	Settlement Arrangement	0.367	0.152	0.586	0.033	-0.254
8	Administration of Treasury Lands	0.233	0.113	0.567	0.01	-0.177
9	Management of Mines	0.167	0.065	0.531	0.006	-0.098
10	Land	0.467	0.172	0.618	0.042	-0.302
11	cadastral survey	0.567	0.223	0.68	0.068	-0.378
12	Administration of Forests	0.1	0.055	0.523	0.002	-0.079
13	Administration of Historical Assets	0.033	0.018	0.466	0	-0.024
14	Consolidation	0.233	0.103	0.548	0.008	-0.169
15	Slum Prevention	0	0	0.278	0	0
16	land Registry	0.233	0.113	0.548	0.008	-0.178
17	Administration of Foundation Immovables	0	0	0.278	0	0
18	Coastal Management	0.1	0.04	0.5	0.001	-0.063
19	Housing Production	0.233	0.115	0.548	0.007	-0.188
20	other…	0.533	0.165	0.667	0.175	-0.275

Density	Avg Dist	Radius	Diameter	Fragmenta	Transitiv	Normist
1.000	1.510	2.000	2.000	0.000	1.000	1.000

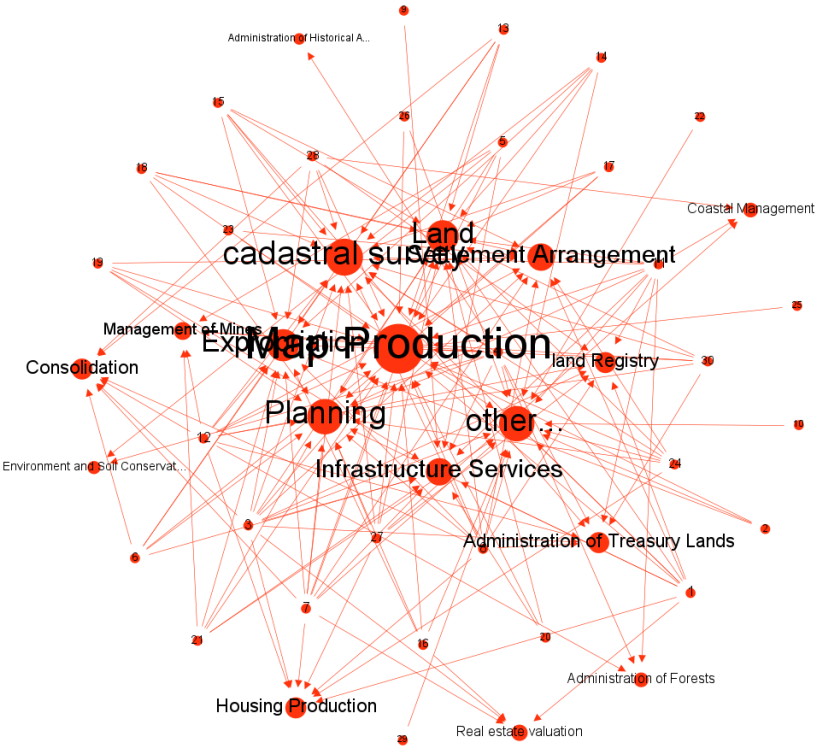

Figure 4. Bimodal network map of the professional works you do in your organisation.

Conclusions and Recommendations

The coming together of individuals or organisations to achieve a common goal or action, to define and share tasks, is called an organisation. When this formation relates to a specific professional group and occupational responsibilities, it is referred to as professional organisation.

In a professional field, it is of great importance to ensure the progress of the subject or discipline with which it is associated

towards professionalism and to realise the increase in the economic and social status of the people working in that professional field. As it is necessary to work for the general welfare of society to achieve this goal, the professional organisation of engineers is of particular importance.

For these reasons, membership in professional organisations is one of the most important factors in increasing professionalism. Organising professions and registering workers in a professional organisation has become commonplace in most industries and around the world. The benefits and career opportunities that come from organising in professions where quality, collaboration, and information sharing are important are now undeniable. In this context, professional organisations are needed for a profession to fulfil its function.

The respondents stated that professional organisation is important for gaining personal and economic rights, strengthening self-confidence, promoting professional rights, and obtaining economic benefits. Participants in the study indicated that the main reasons for becoming a member of a professional organisation were the good work carried out by professional organisations in professional cooperation and the actions of the professional organisation. On the contrary, while becoming a member of a professional organisation, they stated that the political structure of the professional organisation, being close to the political power and having many members were not effective in becoming a member of a professional organisation. The results obtained in the statistical evaluations made according to some demographic characteristics of the participants within the scope of the study can be explained as follows:

- Valuing the opinion of the members of the professional organisation,
- Informing the members about the activities of the professional organisation,

- Struggling to find solutions to the problems of the professional members in the professional organisation.
- Accurately informing members about the latest developments in the profession, changes in laws and regulations,
- Obtaining binding professional decisions to be complied with by the professional organisations,
- Performing duties related to the Ministry to ensure that the required conditions are met.
- Ensuring the development of professional associations, taking into account the common interests.

The relationship desired to be revealed in the study is prepared in a way to reveal the processes of the members of the professional organisation of surveying engineers: "What are the reasons for organising, the reasons for becoming a member, and what are the demands from the organisation?" It is prepared in a way to reveal the processes. The relationship between public institutions, local administrations, and all sectors working with spatial data has been analysed not from a technical point of view but from a social point of view, and it has been tried to reveal the system of working together, which the institutions are not aware of, and which works without being bound by a certain rule, through "social networks". It is thought that these results and evaluations can be reflected across the whole country.

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BÖLÜM IV

The Role And Impact Of Map Applications In Digital Gaming: Exploring Game Worlds

Fatih TAKTAK[1]

Introduction

Video games are games that the user can play interactively on a computer screen, television screen, or mobile device screen. Video games are usually played through a device such as a game console, computer, or mobile device. Video games can be of various genres and designed for very different purposes. For example, action games, adventure games, role-playing games, strategy games, sports games, and simulation games are examples. Games can be played on various platforms, such as PCs, consoles, and mobile devices (Crawford, 2011; Squire, 2003).

There is a close relationship between video games and cartography. Cartography is concerned with the design, production,

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and use of maps. Video games, on the other hand, involve the use of maps for games and define the world of games.

Video games allow players to keep track of their locations and goals, while cartography is used to make the world of games more realistic. Video games provide the information necessary for in-game navigation and travel (Funk, 2005; Dyer-Witheford & De Peuter, 2009).

Cartography is used to design the world of video games and facilitate the players' journey. For example, in a role-playing game, maps can be used to show where players can go, the location of enemies, and in-game paths. Furthermore, video games enable users to use real-world maps and follow real-world paths. This increases the realism of the games and improves the in-game experience of the players (Uluğtekin & Doğru, 2005; Bildirici, 2018).

Open-world video games are games that allow players to freely explore, interact, and fulfill tasks in the in-game world. Such games allow players to go anywhere in the in-game world and interact in any way they wish. Open-world games often feature large and detailed game worlds and allow players to explore the world, fulfill quests, or simply move around the world.

Open-world games offer players freedom, liberty, and flexibility to explore the world of the games. For example, they allow players to explore the game world instead of fulfilling in-game missions, or they allow players to interact with the in-game world in any way they wish. Such games can generally be categorised as role-playing games, action games, or open-world adventure games (Özlem & Şentürk, 2020; Halaçoğlu, 2019).

A map is a visual tool that shows the physical characteristics, structures, roads, streets, rivers, mountains, lakes, and other features of an area or region. Maps show the scale of the actual dimensions of physical areas and their locations. Maps can be used for many different purposes, such as navigation, journey planning, terrain

analysis, geographic information systems (GIS), and historical archives.

The Development of Maps

The historical development of maps covers a very long period and has evolved with the contributions of various civilizations. If we list the important periods of the historical development of maps:

Ancient Periods: Mapmaking began in early civilizations such as Egypt, Mesopotamia, and Ancient Greece. These maps included simple depictions of rivers and geographical features, often represented by lines. The purpose of maps during these periods was often to serve local navigation and agricultural practices.

Middle Ages: During the Middle Ages, maps became more complex. World maps were developed especially for sailors and explorers. Western cartographers, inspired by Ptolemy's geographical studies, tried to produce more accurate maps.

Renaissance Period: The 15th-century Renaissance period was a time of great development for maps. Especially famous cartographers and geographers updated their world maps after new discoveries. New map projections were developed during this period, such as the Mercator projection.

Exploration and Colonization: As European explorers discovered new continents in the 15th and 16th centuries, world maps were constantly updated. Mapping new places and routes played a major role in navigation and trade.

Modern Maps: From the 18th century onwards, mapmaking became more systematic and scientific. Cartography became a professional discipline, and geographical measurement techniques were developed. Technologies such as map projections and geographic information systems (GIS) have made mapmaking more precise and accurate.

Digital Age: Towards the end of the 20th century, the digitization of maps began with the development of digital

technologies. Digital tools such as GIS, satellite imagery, and mapping software transformed map making and use. Digital maps offered quick access, easy updating, and interactive features.

Map Use Today: Today, maps are widely used for navigation, geographical analysis, crisis management, education, and more. Smartphones and online map services enable individuals and organizations to access maps quickly and have become an important part of everyday life.

This historical development of maps reflects the growth of the geographical sciences and human knowledge of the world. This development represents an important historical document reflecting the progress of societies in discoveries and developments (Zekai, 2009; Özmen, 2012; Demiralp, 2009; Özağaç, 2006).

The History of Maps in Digital Games

The history of maps in digital games has developed in parallel with the evolution of the video game industry. In the early days, maps were used for in-game navigation with simpler graphics and limited detail. Here is the history of maps in digital games:

Atari and Arcade Era (1970s–1980s): During this period, game maps usually consisted of simple level maps. Games were usually played on 2D platforms, and maps usually provided limited information on the screen. Especially in arcade games, players often had to follow a specific path to get to the next level.

Console Games (1980s–1990s): Console gaming was a time when maps were slightly more advanced. Games offered the opportunity to explore larger worlds, and maps were used to show players' general locations. However, they often had more static and basic graphics.

3D Graphics and Open World Games (2000s–Present): With the proliferation of 3D graphics, maps became much more detailed and complex. Open-world games started the trend of having large

maps. In these games, maps were used to help players navigate vast worlds and complete missions.

Real-Time Map Systems (Today): Today, game developers are working on real-time map systems. Players can use maps in the form of dynamic and interactive maps that are often updated instantly during gameplay. This makes it much easier for players to set goals, follow missions, and explore the world.

Augmented Reality (AR) and Virtual Reality (VR) Maps: Recently, maps have become even more interactive with AR and VR technologies. These technologies allow players to more closely examine and interact with the game world in real time.

The evolution of maps in digital games has occurred in parallel with technological developments and advances in game design. Today, maps have become an important tool that allows players to explore and interact with the game world. These ever-evolving technologies aim to provide players with deeper and richer gaming experiences (Yılmaz, 2022; Samur, 2022; Delil, 2020; Kara, 2018; Bingöl, 2018; İpek, 2020; Vasista, 2022).

Digital Physical World Map Interfaces

Digital physical world maps are interfaces that show users real-world geography through online mapping services or applications. These maps are typically updated in real time and are accessible to a wide range of users. Key features of digital physical world map interfaces:

Navigation and Directions: Maps provide users with directions from one specific location to another. Users can get directions to where they want to go by searching for a specific location or entering an address.

Terrain and Geographic Details: These maps often include terrain and geographic details that are updated in real time. Details such as mountains, rivers, cities, and countries are shown to users.

Street View: Users can examine the street view of a specific address. This feature shows photos of a specific location, allowing users to explore that area in more detail.

Traffic Status and Road Map: Some maps show traffic conditions and provide users with information about traffic congestion. In addition, road maps show various transportation options (car, public transport, walking).

Location Sharing and Beacons: Users can mark specific locations, create bookmarks, or share their location with others. This allows saving appointment places, points of interest, or specific addresses.

Personalization of Map Data: Users can often personalize the map interface according to their preferences. For example, they can enable or disable certain layers (traffic, weather, and tourist spots).

These map interfaces are usually accessible through web browsers or applications developed for smartphones. They enable users to navigate in real time, explore places, and understand world geography. They are also useful in many areas, such as travel planning, the discovery of local businesses, and location-based services (Nakazawa & Tokuda, 2007; Pittarello & Stecca, 2011).

Game Mechanics

Game mechanics is the set of rules, systems, and interactions that define the basic functioning of a game and how it is played. Game mechanics encompass the gameplay dynamics, rules, and elements that make up the basic structure of a game.

These elements include the fundamental rules that guide players' interactions, actions, and experiences within the game world. Game mechanics provide guidance on the core components of the game and how it works.

The game mechanics may include the following:

- Game Goals: The goals, objectives, or tasks that players are trying to achieve.
- Rules: Player interactions, limitations within the game, and game dynamics.
- Feedback: The feedback players receive about the consequences of their actions.
- Challenge and Difficulty: The difficulty of the game, the obstacles or challenges players face.
- Progression and Levels: The levels, chapters, or stages through which players progress and develop in the game.
- Strategy and Tactics: The strategies and tactics players use to achieve certain goals
- Scoring and Rewards: Scoring, rewards, or achievements based on players' performance
- Items and Resources: in-game items, resources, or abilities that players can collect or use.
- Social Interaction: Cooperation, competition, or social interactions between players

Game mechanics are the cornerstone of a game and include elements that affect the gameplay experience. These elements make a game fun, playable, and addictive. Game developers strive to create games that draw players into the game world by using game mechanics in a balanced and effective way (Demirbaş, 2019; Cankat, 2013; Şen, Küçükkaykı & Sürer, 2021).

Game Worlds and Game World Interfaces

Game worlds are virtual environments that players interact with in digital games. These worlds include game locations, atmosphere, characters, quests, and general game content. Game-world interfaces are graphical tools that allow players to navigate, interact, and perform in-game activities in these virtual worlds. Here

are some important topics related to game worlds and their interfaces:

Game Worlds:

- Geographic Structures and Atmosphere: Game worlds usually include specific geographical structures, cities, natural environments, space stations, etc. Game worlds are also enriched with different graphical and audio elements to match the atmosphere of the game.
- Characters and Creatures: Game worlds contain different beings, such as various characters, main characters controlled by the player, supporting characters, or enemy creatures.
- Quests and Stories: Game worlds often present players with various quests, side quests, or story elements. These quests can contribute to the game's progression, story, or character development.
- Game World Interfaces:
- Maps and Navigation: Game-world interfaces often include maps to help players explore the world and find destinations.
- Task Lists and Progress Tracking: Game world interfaces list tasks that players need to accomplish. They also often include progress bars or lists to track progress and see completed tasks.
- Character Screens and Customization: Players can often customize their characters and change their abilities, equipment, or appearance through character screens.
- Inventory and Item Management: Inventory screens are available for players to view, manage, and use the items they have collected.

- Social and Online Interaction: In multiplayer games, game-world interfaces often include friend lists, chat tools, or group creation options to facilitate social interactions.

Game world interfaces allow players to navigate and interact within game worlds. These interfaces have an important role in facilitating the game experience, allowing players to explore game worlds and experience their stories (Jorgensen, 2013; Toups & ark., 2019).

Definition of Map Interfaces

Map interfaces are interfaces, usually used in digital environments, that present map and navigation information visually. These interfaces allow users to explore a specific geographic location, navigate, and generally see a map representation of a place. Map interfaces usually visually represent a variety of information and often assist users in reaching their destinations.

These interfaces may typically include the following features:

- Map View: Provides the user with a visual representation of a specific geographic location or region on a map. This can often be at different scales (overview, street view).
- Navigation Tools: Tools that help users navigate the map and reach their destination. This can include features such as zooming in, zooming out, dragging the map, etc.
- Geolocation and Search: Allows users to search for a specific location or mark a specific location.
- Traffic Information: Some map interfaces display real-time traffic information, allowing users to follow traffic conditions during their journey.
- Route Planning and Direction Indication: Helps users plan, navigate, and travel from one point to another.
- User Friendly Interface: Map interfaces usually have an interface that users can easily understand and use.

- Additional Layers of Information: Some map interfaces allow users to display additional information on the map, such as weather, local businesses, and tourist attractions.

Such interfaces are usually accessible through map service providers or applications. They help users with travel planning, location-based services, location sharing, and geographic exploration in general (Çuhadar, Aydoğan & Bahar, 2013; Uluğtekin & ark., 2019).

Origins of Maps in Prehistoric Games (1880–1954)

The origins of the maps in the known games for the prehistoric period may have more to do with local and traditional games, often specific to various cultures, as there are no specific standards or records.

In the period between 1880 and 1954, however, games were often centered on traditional games, children's games, and simple competitive games. These games were often based on physical interaction, and maps or the use of maps was not a common feature as in modern digital games.

Games from this period were known as games made with simple materials, usually played within the family or on certain days in the community. Instead of maps, games were often physically played in a certain area or within certain rules. For example, games such as hopscotch, hopscotch, jumping rope, and various sporting events were usually played in specific areas and did not involve complex maps.

The use of maps or map-based games was more likely to be found in the context of educational purposes, strategic games, specific strategy games, or similar situations. However, in this period, complex map interfaces or map-based games were generally not common, as in digital games.

Instead of games associated with specific maps, games in this period were more traditional games based on physical interaction,

simple rules, and fun. The complex map mechanics and usage seen in digital games became more prominent in later periods with technological developments and the evolution of game design (Toups & ark., 2020; Jørgensen, 2023).

From the Physical World to the Digital (1954–1975)

The period 1954–1975 covers a period in which technological advances in the physical world, especially computer technology, began to develop. In this period, the evolution of developments in the physical world towards digital includes important milestones in computers and digitalization.

In this period, the following developments stood out in the transition from the physical world to the digital:

- Widespread Use of Computer Technology: Computer technology started to develop rapidly in this period. The first computers used by large companies, scientific research institutions, and military institutions became widespread.
- First Games and Entertainment Software: During this period, the first games and entertainment software running on computers began to be developed. These were usually games with simple graphics and limited gameplay.
- Simulation and Educational Software: Computers enabled the development of software used for training and simulation purposes. In this period, some educational institutions started to develop educational materials through computers.
- Digital Map and Graphic Technology: Digitizing maps and processing them through computers became more widespread in this period. Computers enabled the digitalization and processing of maps and graphical data.
- First Arcade Games and Iconic Games Like Pong: In the early 1970s, arcade games gained popularity. Pong, published by Atari in 1972, was a turning point in the home entertainment and gaming industries.

During this period, important steps were taken towards computer technology and digitalization. Digitalization became more evident in areas such as games, entertainment software, and map technology, and this paved the way for the development of digital games and digital maps in later periods (Toups & ark., 2020; Jørgensen, 2023; Ma & Cui, 2020).

Hand-drawn Maps for Adventures (1975–)

Hand-drawn maps are a common element, especially when games are adventure- or exploration-themed. Such maps are often used in fantasy game worlds or real-world-based adventure games. From 1975 to the present day, such maps have been very popular, especially in role-playing games (RPGs), video games, tabletop games, and story-based games.

Features of this type of map may include the following:

- Handcrafted Details: Because they are hand-drawn, these maps often contain a personal touch and detail. Their characteristic style and the quality of the linework make the map unique.
- Fantasy Worlds and Locations: Maps created for RPGs or adventure games often show the locations of fantasy worlds, cities, dungeons, adventure locations, and characters.
- Routing and Wayfinding: Shows paths, routes, or specific points that players need to follow as they travel through the game. These maps are used to show important places to explore or visit.
- Elements of Mystery and Exploration: Hand-drawn maps are used for players to explore and find mysterious locations. They have the potential to show unseen or undiscovered areas.
- Supporting the Story of the Game: In adventure games, they are used to support storytelling and allow players to dive deeper into the game world.

These types of maps often help players to understand the game world, feel the atmosphere of the game being played, and feel connected to the story. Hand-drawn maps can be an essential part of in-game exploration and adventure, allowing players to understand and interact with the game world (Harzinsk, 2013; Warodell, 2016).

Procedural Generation (1975–)

Procedural generation is the method of using algorithms and systems to create content in the game development process. This method is used to generate game worlds, levels, characters, items, and more randomly or algorithmically. In traditional game development processes, game worlds and content are usually designed by hand. However, procedural generation automates this process and enables the creation of more dynamic, variable, and expansive game worlds.

Procedural generation can be used in the following areas:

- Game World Creation: Used to create large game worlds. This is often used for large open-world games or randomly generated maps. For example, in games like Minecraft, the world is randomly generated.
- Level Design: Used for automatic or random generation of game levels. This feature is common in different game genres, from platformers to rogue-like genres.
- Character Generation: Procedural generation can be used to generate enemies or random characters in games. This can be used to determine the characteristics of enemies, such as their abilities, appearance, equipment, etc.
- Item and Inventory Creation: Procedural generation can be used to randomly generate items in games. This can increase the characteristics and variety of items available in a player's inventory.

Procedural generation helps game developers create large-scale and diverse content. This can diversify the gaming experience

and make each game trial more unique. However, procedural generation can sometimes also be associated with unpredictability and instability, so it is important to maintain a careful balance (Yayla & Bülbül, 2018; Bakan, 2017).

Playback on Maps or Text (~1986)

Around ~1986, there was a time when maps or text-based playback were quite popular in computer games. This was a time when computer games still had limited graphical capabilities, and games were often text-based.

Some games used simple graphical maps to show game worlds, levels, or playing areas. These maps usually showed the game area using simple symbols or markings and often provided an overview for players. Role-playing games (RPGs), adventure games, or strategy-based games in particular used simple maps to help players find their way around or explore the game world.

Text-based games were games in which players explored the game world with text-based commands. Players used text-based commands to advance their characters, solve puzzles, or follow story progress. These games relied on rich storytelling and the use of players' imaginations.

In particular, games such as Zork, Adventure, and Infocom were examples of text-based play and were popular. These games allowed players to explore and interact with the game world through text-based commands.

This was a time when graphical capabilities for computer games were still limited. Games were often text-based, and graphical visuals were not as detailed or complex as they are today. Players explored game worlds based on their imagination, and the storytelling of games was largely text-based (Sayılgan, 2012).

Decreasing Complexity, JRPGs, and Automated Maps (1986–)

Around 1986, Japanese role-playing games, or JRPGs, were an important period in the video game industry. During this period,

some JRPGs began to use automated mapping systems to facilitate the gameplay experience and help players explore the game world.

Features of JRPGs can include the following:

- Deep Storytelling: JRPGs are often notable for their complex storylines and character development. Players often encounter interactive storytelling as they develop their characters and progress through the story.
- Traditional Turn-Based Battle System: JRPGs from this era often featured turn-based battle systems. Players took turns choosing their character's actions, and the order of battle was determined by these choices.
- Exploration and Discovery of the Game World: In JRPGs, players often explore large and expansive game worlds. This includes cities, dungeons, passwords, and secret spots in different regions.

The use of automated maps may also have increased during this period. Automated map systems allowed players to create a map or travel on a map as they explored the game world. This could be particularly useful in JRPGs when traveling and exploring large game worlds. Players could often view explored areas through automated maps that they could access later in the game.

In JRPGs, the use of automated maps when exploring the game world could give players a sense of the game's atmosphere and a less cluttered experience when exploring. This could have made the game easier to play and allowed players to focus on the story (Toups & ark., 2020).

3D Game Worlds (1996–)

From 1996 onwards, 3D game worlds revolutionized the video game industry. This was a time of great advances in game development technologies and the widespread use of 3D graphics in game worlds. 3D game worlds made the gaming experience more realistic, deep, and visually impressive.

Some of the features of 3D game worlds include:

- Realistic Graphics and Locations: 3D games present game worlds with more realistic and detailed graphics. Characters, scenery, and objects are depicted in greater detail.
- Free Movement and Exploration: 3D game worlds offer players more freedom of movement. Players can often move around the game world, climb, jump, and explore in different directions.
- 3D World Design: 3D game worlds give game developers the opportunity to create larger and more detailed worlds. This applies to large open-world games, action-adventure games, RPGs, and more.
- Increased Advanced Game Mechanics: 3D games often offer more complex game mechanics and interactions. Physics-based game mechanics, complex puzzles, combat systems, and more can be part of 3D game worlds.
- Virtual Reality and Augmented Reality: In later years, 3D game worlds have advanced further with technologies such as virtual reality (VR) and augmented reality (AR). Players became more immersed in the game world.

This was a period when major game studios and independent developers explored 3D game worlds and made major advances in gaming technologies. 3D game worlds have the potential to deliver visually immersive experiences in the gaming industry, increasing the depth, realism, and playability of games (Toups & ark., 2020; Farman, 2020).

Smart Devices and Game Map Interfaces Merge (2004–)

From 2004 onwards, smart devices, especially smartphones, marked a major turning point in the mobile gaming industry. This period greatly influenced the game-playing experience on mobile devices, and game-map interfaces became more popular on mobile platforms.

The following features stand out in this period:

- Mobile Gaming Platforms: The popularization of smartphones and tablet computers led game developers to focus on mobile platforms. This has led to an increase in the number and variety of games that can be played on mobile devices.
- Touchscreens and User Interface: Since mobile devices run on touch screens, game maps and interfaces are optimized to facilitate touch interactions. Players can swipe, zoom, and tap to interact with the map.
- GPS and Location-Based Games: The GPS capabilities of mobile devices have enabled the rise of location-based games (such as Pokemon Go). Such games create game mechanics based on real-world maps.
- Connected Gaming Communities: Mobile devices have increased player interaction with games. Social media integration has made it easier to play games with friends, share achievements, and build online communities.
- Mobile App Stores: App stores such as Apple's App Store and Google Play Store have enabled game developers to bring their games to a wide audience. Game maps played an important role in the promotion and marketing of games in these stores.

This was a time when game map interfaces became more important on mobile devices, and mobile gaming experiences changed dramatically with the impact of touchscreens and location-based features. Game developers have made efforts to provide players with more immersive and customized game maps using the possibilities offered by smart devices (Toups & ark., 2020; Farman, 2020).

Simplifying Complexity and Improving Game Quality

Complexity simplification is a common strategy for improving game quality in game design and development. This strategy aims to provide a better gaming experience by reducing unnecessary complexity in games. In doing so, it improves game quality by preserving the core mechanics of the game and improving gameplay.

Here are some of the key strategies:

- User Friendly Interfaces: Instead of complex menus, excessive options, or cluttered user interfaces, simple and user-friendly interfaces can improve the gaming experience. Players can more easily understand and use the basic functions of the game.
- Clear Game Mechanics: Game mechanics should be understandable. If players can quickly learn how to play the game, it allows them to enjoy the game.
- Gradual Learning: Increasing the difficulty of games gradually improves the learning process and experience for players. Players learn and master new skills as the game progresses.
- Balanced Difficulty Levels: Games that are too easy or too difficult can negatively impact the player experience. Balanced difficulty levels ensure that the game both entertains and challenges players.
- Real-Time Feedback: Giving players real-time feedback helps them understand how they are performing in-game. This allows them to improve as they play the game.

Simplifying complexity aims to make the game experience more accessible and enjoyable while retaining the core features of the game. This strategy allows the game to reach a wide range of players and makes it easier for players to understand the game (Güneş, 2016).

Collaborative Cartography of Game Maps

The term "collaborative cartography of game maps" usually refers to players working together to explore and map game worlds. This concept involves collaborative map creation, exploration, and information sharing between players in games.

Collaborative cartography can be particularly useful in some game genres and games where in-game maps are missing or poor. Some players may work together to create maps to better understand the game world and learn more as the game progresses. This can be particularly useful in mysterious or unexplored areas.

This kind of collaborative cartography can often take place in gaming communities or online platforms. Players can help other players by sharing their experiences, explorations, and maps.

Especially in some role-playing games or exploration-based games, players' efforts to work together to complete or enrich world maps can make the game experience richer. This can help the game provide community-based interaction and encourage communication and cooperation between players (Shen, 2014; Toups & ark., 2019).

Digital Games and Cartography Applications

"Grand Theft Auto V" (GTA V) is an important example of the gaming world and an example of how cartography can be used in digital games. The game offers a highly detailed open world, and the use of maps is important for players to explore the game world and interact with various elements of the game mechanics.

In GTA V, map use plays an important role in the following ways:

- Large and Detailed Map: The game offers a large open world. With a fictional city called Los Santos, environmental zones, mountainous areas, countryside, and other regions, the game offers players a vast game world. The map shows these regions in detail.

- Navigation and Targeting: The map is used for players to navigate to specific locations or find mission locations. Navigation provides directions to locations marked on the in-game map.
- Missions and Marked Points: The game marks mission locations or landmarks on the map. Players go to the locations indicated on the map to complete quests or participate in in-game activities.
- Display of Mechanical Elements: The map shows players the mechanical elements in the game. For example, weapon shops, automobile repair shops, restaurants, etc. are prominently displayed on the map.
- Introducing In-Game Events: The map introduces players to in-game events. Races, entertainment, missions, and other events are highlighted on the map.

Through the use of maps, GTA V helps players explore the game world and contribute to the game's story progression. The map helps players navigate the game world, complete missions, and interact with various aspects of the game. Such open-world games offer players a broad exploration experience through on-map navigation, targeting, and a detailed game world (Games, 2008).

"Assassin's Creed Odyssey" is an impressive example of the application of cartography in the game world. The game features a large open world, and the use of maps allows players to explore the game world, complete missions, and interact with various aspects of the game.

Assassin's Creed Odyssey highlights the use of maps in the following ways:

- Large and Varied Map: The game presents the different regions of ancient Greece in detail. Players explore cities, islands, the countryside, and other regions. The map shows players the details of different geographical regions.

- Exploration and Landmarks: The map marks the places players explore. This allows players to turn around, return to places they have not visited before, and complete quests.
- Quests and Side Quests: The map indicates quests, side quests, and events. Players start and complete missions by going to the markers on the map.
- Settlements and Landmarks: The map shows players settlements, temples, arenas, dungeons, and other important locations. These places attract players' attention and encourage exploration.
- Navigation and Travel: The map guides players to specific locations and destinations. Players navigate to locations marked on the map.

Assassin's Creed Odyssey allows players to explore the game world through the use of maps. The map helps players complete missions, explore, and participate in in-game events. The game offers a wide open-world experience through the use of maps and supports players in exploring the game world (Politopoulos & ark., 2019; Cole, 2022) (Fig., 1).

Fig. 1. A benchmark example from the play is that it has been made to create authentic representations of ancient Greece.

"Watch Dogs 2" is an interesting example of cartography applications in the game world. As the game tells the story of a hacker set in a modern city (San Francisco), the use of maps helps players with exploration, goal-setting, and interaction.

The use of maps in Watch Dogs 2 plays an important role in the following ways:

- Large Open World Map: The game presents the city of San Francisco in detail. Players explore different areas of the city, tourist attractions, harbors, and landmarks. The map shows players an overview of the city.
- Goal Setting and Missions: The map helps players set missions. Mission points and events are indicated on the map. Players start and complete missions by going to the locations shown on the map.
- Marked Places and Interaction: The map marks locations that may be of interest to players. Players go to these marked locations to explore, complete quests, or participate in events.
- Travel and Navigation: The map shows players paths to their destinations. Players can use navigation to reach the locations marked on the map.
- Hacker Influences and Information Gathering: The map helps players gather information and discover hacker agents (security cameras, hackable devices, etc.) in the city.

Watch Dogs 2 allows players to explore the game world and interact with game mechanics through the use of maps. The map helps players complete missions, explore the city, and participate in in-game events. Through the use of maps, the game offers players a broad exploration experience around the hacker theme in a modern city (Fontaine, 2020; Leonard, 2009).

"Assassin's Creed Origins" is a remarkable example of the application of cartography in gaming. The game presents ancient

Egypt in detail, and the use of maps helps players explore, complete missions, and interact with the game world.

Map use in Assassin's Creed Origins plays an important role in the following ways:

- Large and Detailed Map: The game shows the various regions of ancient Egypt in detail. Players explore cities, temples, pyramids, the countryside, and other areas. The map shows these locations to players.
- Quests and Side Quests: The map indicates quests and side quests that players can do. Players go to missions on the map to complete tasks or participate in events.
- Navigation and Goal Setting: The map guides players to their goals. Players navigate to locations marked on the map.
- Exploration and Hidden Spots: The map marks places that players need to explore. This allows players to turn around and return to places they have not visited before.
- Dungeons and Landmarks: The map shows players dungeons, landmarks, and special points. Players go to these locations to complete quests or explore.

Assassin's Creed Origins allows players to explore the game world through the use of maps. The map guides players through completing in-game activities and exploring the game world. The game offers players the opportunity to explore ancient Egypt through a detailed open-world map and the use of maps (Poiron, 2021; Vicent & Mendaza, 2018).

"Red Dead Redemption 2" is one of the games that successfully demonstrates the interaction between cartography practices and the game world. The game offers a large open world,

and the use of maps allows players to explore, complete missions, and interact with the game world.

The use of maps in Red Dead Redemption 2 is characterized in the following ways:

- Large and Detailed Map: The game presents 1800s America in great detail. Players explore cities, towns, farms, mountains, and campgrounds. The map shows these areas in detail.
- Navigation and Targeting: The map guides players to reach their destinations and complete missions. Players can use navigation to get to places marked on the map.
- Missions and Marked Places: The map marks missions and landmarks. Players start and complete missions by going to the locations indicated on the map.
- Campsite Management: Players can set up camps and manage them on the map. Resources, quests, and other camp activities are indicated on the map.
- Exploration and Hidden Spots: The map shows hidden locations and activities for players to explore. This allows players to explore the game world more deeply.

Red Dead Redemption 2 allows players to explore the game world through the use of maps. The map helps players complete missions, explore, and interact. The game offers players the opportunity to explore the American wild west through a large open-world map and detailed map use (Holmes, 2019).

"Minecraft" stands out as a game that offers an original and unique mapping experience. The game gives players the freedom to create their own worlds, and this extensively includes the ability to create and explore maps.

Map use in Minecraft is characterized in the following ways:

- Procedural World Creation: Minecraft allows players to create a world, each of which is unique. Players can explore randomly generated worlds and discover new regions on the map.
- World Building with Blocks: Players have the freedom to build in a world made of blocks. The map provides a backdrop for players to create their own buildings, cities, or any other structure.
- Exploration and Routing: Players can explore the world and navigate to different areas through coordinates on the map and other navigation tools.
- Map Creation and Landmarks: Players can create their own maps and place landmarks. This can be helpful for remembering previously visited areas and returning to specific locations.
- Multiplayer Experience: Minecraft offers multiple player options. Players can play together in different worlds and create maps.

Minecraft offers players a wide range of maps for creativity and exploration. The game is based on map use and gives players the freedom to create and explore their own worlds. This gives players the experience of creating and exploring a wide range of game worlds (Hill, 2015).

"Assassin's Creed Unity" offers a slightly different map experience compared to previous games. The game is set during the French Revolution and offers a detailed recreation of Paris.

The use of maps in Assassin's Creed Unity is characterized by

- Detailed Historical City: The game presents the city of 18th-century Paris in detail. Cathedrals, streets, historical buildings, and various districts are

presented to players. This detailed map allows players to explore the city.

- Missions and Events: There are missions, side quests, events, and secret locations marked on the map. Players start and complete missions by going to the markers on the map.
- Nemesis and Targets: The game marks the locations of enemies and objectives. Players go to these targets on the map to complete missions or interact with enemies.
- Historical and Iconic Buildings: The map marks historical and iconic buildings. Well-known landmarks such as Notre-Dame Cathedral are highlighted on the map.
- Travel and Navigation: The map shows players quick travel points and navigation routes. This allows players to quickly travel around the city of Paris.

Assassin's Creed Unity allows players to explore a historical city through the use of maps and contributes to the game's story progression. The game offers players the opportunity to explore 18th-century Paris through a detailed historical city map and map use (Menon, 2015).

Cartography systems for today's open-world games may include in-game maps and markers to help players better navigate and use the map. However, in the future, these systems may include features such as the following to provide a more realistic and natural experience:

AI, or machine learning technology, helps the player explore and navigate the in-game world.

Real-time mapping and placement. In-game maps can be updated in real-time to provide a more realistic experience for players.

Dynamic mapping. In-game maps can change dynamically and according to the player's actions to provide a more realistic experience for players.

Using augmented reality or virtual reality technology to show the in-game world in a more realistic way and give the player a better understanding of the in-game world

Add features within the map that players can use in real life. For example, a map application that players can use could include real-time traffic information, alerts, and directions.

Some expected future developments for open-world games could be

- More realistic and natural gameplay: Improved AI and machine learning technologies will make the in-game world more realistic and help the player explore and navigate the in-game world.
- Larger and more detailed game worlds: Increased processing power and storage will allow game worlds to become larger and more detailed.
- Higher resolution graphics: Improved graphics processor technologies will make games look more realistic and beautiful.
- Support for augmented reality or virtual reality: Augmented reality or virtual reality technologies will provide players with a more realistic gaming experience.
- Deeper storytelling: Emerging storytelling technologies will allow games to tell deeper and more compelling stories.
- Multiplayer: As open-world games appeal to a wider player base, multiplayer features will become more prominent.

- More realistic in-game physics: Improved physics processing technologies will allow games to offer a more realistic gameplay experience.

Conclusions and Recommendations

In digital games, the map is an important element that enriches the game experience and guides players. Maps help to explore the game world, manage quests, achieve goals, and interact with game mechanics. Furthermore, mapping applications offer game developers the opportunity to create larger, more detailed, and more dynamic game worlds.

Cartography apps contribute to the overall design of games and make the gaming experience more immersive. Through maps, players explore the game world more deeply and reach their goals more easily. Cartography enhances the design of game worlds and game mechanics, allowing players to enjoy games more.

As a result, mapping in digital games is an important component that makes the game experience more interactive, guided, and enjoyable. The map provides the opportunity to better explore the game world, successfully complete missions, and navigate the game. For game developers, the map enables them to create larger, more detailed, and more diverse game worlds. Therefore, it can be argued that the map plays a critical role in ensuring that games provide a successful and satisfying experience.

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Mekansal Bilgi ve Analiz

Harita Mühendisliği , gelişen teknolojiyle de birlikte bir çok bilim dalıyla işbirliği içinde olan bir mühendislik dalıdır.Konum üzerinde yapılan her türlü bilimsel çalışma bu alanla ilişkili olarak ele alınmaktadır. Günümüzde çok sık kullanılan bilgi sistemlerinin konumla ilişkilendirmesi gerekliliği harita mühendisliğini inter disipliner bir dal haline getirmektedir.

Bu kitabın amacı gerek harita mühendisliği ve gerekse harita mühendisliğiyle disiplinler arası yapılan çalışmaları değerlendirmek ve kullanıcıların hizmetine ve bilgisine sunmaktır. Mekanla ve konum bilgisiyle ilişkilendirilen tüm mühendislik dallarının yayınlarını değerlendirmek hedeflenmektedir.

Şehir ve bölge planlaması , inşaat , jeoloji,mimarlık , enerji sistemleri , orman ,peyzaj mimarlığı, zıraat gibi konumsal bilgi üzerinde çalışan bilim dallarıyla yapılan yayınlar bu kitap kapsamında yer alabilecektir.Uzaktan algılama , Cografi bilgi sitemleri,Bilişim teknolojileri gibi mekana dair bilgi üreten yayınlarda bu kapsamda yer alacaktır.

Günümüzde konum bilgilerinin atmosfer dışından da elde edilmesi nedeniyle uydu ve uzay teknolojilerinin ve uyduların çektiği resimler üzerinden elde edilen konumsal bilgilerin tüm bilim dallarinda kulanılması da bu tür yayınların bu kitap kapsamında değerlendirmemizi sağlayacaktır.

Gayrımenkul değerleme konusu da hem harita mühendisliği ve hem de ekonomi ile ilgili bir çok bilim dalının ilgi alanına girmektedir. Gayrımenkul değerleme konusundaki çalışmalarda bu kitapda yer alacaktır.

Bu kitabın tüm yararlanıcılar için hayırlı olmasını diliyor. Tüm bölüm yazarlarımıza şimdiden teşekkür ediyoruz.

BİDGE