FEATURES

Project Delay Economics

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ABSTRACT

While many real estate transactions and projects go forward as scheduled, from time to time there are instances of project delay that can result in economic losses. Because time is money, these delays may impact value. A delay might have positive, neutral, or negative impacts on property value, depending on real estate market conditions, the use of the property, or other specific issues and circumstances. A variety of valuation methodologies can be employed in these situations. Ultimately, it is the employment of valuation methodologies that are based in conventional approaches to value that will yield an analysis of the financial impacts. Project delay valuation approaches are an invaluable resource in computing some types of damage. Indeed, project delay economics has played a key role in computing damages in some of the world's most complex real estate damage cases and should be considered in any real estate damage assignment.

On March 1, 1954, the US military detonated a thermonuclear hydrogen bomb at the Bikini Atoll in the Marshall Islands. Given the code name Castle Bravo, this was the most powerful atmospheric nuclear bomb in the history of the world. The blast was so powerful that it vaporized two-and-a-half islands and created a crater approximately a mile wide and 400 feet deep.

This nuclear test also became the largest environmental case in world history. Nuclear fallout spread out over a hundred miles and contaminated vast areas, including inhabited islands. One of the issues to arise from the event involved the extent of property damages.

Like any real estate damage case, the focus was on costs, loss of use, and risk, sometimes referred to as *stigma*. In terms of costs, they were paid for by the US government. Yet the contaminated areas were so vast that the remediation took decades, and much of the land was never remediated.

In spite of the size and complexities in the case, in the property damage analysis completed for the Nuclear Claims Tribunal the key valuation issue came down to loss of use. Indeed, the loss or delay of use is often the core issue in real estate damage assignments.

Overview of Project Delay

Time is money. Real estate valuation is often based on schedules and revenues that are forecasted over time. With forecasts, it is always important to identify and address issues that can cause delays.[1] In most circumstances, the original projections reasonably reconcile with actual performance. However, some delays may be unforeseen or unavoidable despite the best management practices. Delays could be due to legal, contractual, construction scheduling, or eminent domain issues or due to externalities, contamination, or any variety of detrimental conditions. Some delays may be due to negligence or other improper conduct. Regardless of the underlying reasons, delays can impact construction, sales, leasing, or land development. Because of this, delay claims are major sources of litigation.[2]

1. M. E. Abd El-Razek, H. A. Bassioni, and A. M. Mobarak, "Causes of Delay in Building Construction Projects in Egypt," *Journal of Construction Engineering and Management* 134, no. 11 (November 2008): 831–841.
2. Hamed A. Al-Saggaf, "The Five Commandments of Construction Project Delay Analysis," *Cost Engineering* 40, no. 4 (April 1998): 37–41.

With project delay cases, the *target date* represents that point in time when the project would have gone forward but for the delay. The *delay date* represents the point in time when the project actually goes forward. Both a target date and a delay date represent potential respective dates of value.

In sales or lease situations, delays can show up as additional days, months, or years to sell or lease a property. In land development projects, delays can show up as additional time to commence construction. In construction projects, delays can result in additional completion time or a delay in the ultimate utilization of the property.[3] Extended absorption periods can erode profitability.[4]

A central theme in the analysis of project delay is the time value of money and the reality that timing has an impact on value. In some assignments, the absorption costs have considerable significance. Segregating variable costs and fixed costs also can be important. Adding to the complexity is that there are both static and forecasted valuation models. Appraisers may be faced with valuations that compare the market value of an original proposed project with the market value with a delayed construction timeframe. Thus, the valuation problem would be to determine the damages, if any, caused by the project delay.

While delays often have negative consequences, they can also have positive or neutral financial effects, depending on a number of factors. In one case, the hold up of construction could cost a developer millions of dollars, yet in another case a delay could result in better market conditions or other factors whereby profits are higher than they would have been on the target date. For example, suppose a house is in escrow for $300,000 and the sale is delayed when the buyer backs out. If the property is then quickly sold for $315,000 to another buyer, the delay had a positive effect for that property owner. Still other delays may be inconsequential or part of the inherent risks of a project. Some delays can be mitigated, while others cannot. Some delays may be inconsequential, yet multiple-year delays can have substantial economic losses.[5]

Construction Delays

A key objective of a construction project is to deliver a quality product in a timely, cost-effective, and safe manner.[6] Because of the potential severity of impact, delay is one of the most important issues in construction management.[7] The scheduling of construction projects is complex, with some tasks being performed in parallel to others, while other tasks are serial in nature. A delay in one area can have a downstream effect that impacts other tasks.

Delays may result in disputes, damage claims, and even total project abandonment.[8] Excusable delays are those that are not attributable to the contractor's actions and typically involve unforeseen events. These events are beyond the contractor's control and are without fault or negligence on their part.[9] Nonexcusable delays result from the contractor's or subcontractor's actions or inactions. These can include poor planning, negligence, and other errors or omissions.

Other Causes of Project Delay

While construction scheduling is a common type of project delay, a wide variety of other factors can also cause delay. Discovering asbestos, lead-based paints, expansive soils, or subsurface contaminants during a redevelopment project could cause delays.

There are also nonconstruction issues, such as delayed sales, or disruptions to leases or land development projects. Furthermore, there could be legal or title disputes, toxic spills, buyer back-out, crimes, geotechnical discoveries, and eminent domain issues. Unexpected area-wide calamities, such as tsunamis, earthquakes, environmental disasters, volcanic eruptions, train derailments, fires, plane crashes, and a variety of other externalities and detrimental conditions can cause a project delay.

3. George R. Stumpf, "Schedule Delay Analysis," *Cost Engineering* 42, no. 7 (July 2000): 32–43.
4. Don M. Emerson, Jr., *Subdivision Valuation* (Chicago: Appraisal Institute, 2008), 105.
5. Jay Dushoff and Denise Henslee, "When Eminent Domain 'Working Rules' Don't Work," *The Appraisal Journal* (July 1991): 429–435.
6. Osama Y. Abudayyeh, "A Multi-Media Construction Delay Management System," *Microcomputers in Civil Engineering* 12, no. 3 (May 1997): 183–192.
7. Jungwuk Kim, Sangyoub Lee, Taehoon Hong, and Seungwoo Han, "Activity Vulnerability Index for Delay Risk Forecasting," *Canadian Journal of Civil Engineering* 33, no. 10 (October 2006): 1261–1270.
8. Abdelnaser Omran, Ooi Ai Ling, Abdul Hamid Kadir Pakir, and Mahyuddin Ramli, "Delays Factors in Construction Projects Development: The Case of Klang Valley, Malaysia," *Journal of Academic Research in Economics* 2, no. 2 (November 2010): 135–158.
9. Sabah Alkass, Mark Mazerolle, and Frank Harris, "Construction Delay Analysis Techniques," *Construction Management and Economics* 14, no. 5 (1996): 375–394.

In practice, projects may also suffer from financial complications that cause delays.[10] Indeed, the appraisal process itself could cause a transactional delay. An erroneous appraisal can throw a sophisticated transaction completely out of whack and result in costly delays.[11]

Cost-Use-Risk Valuation Methodology

Project delay and *loss of use* are detrimental conditions, meaning that they are conditions that could potentially result in a diminution in value. The valuation methodologies for addressing detrimental conditions are well established.[12] Table 1 outlines a matrix for analysis of detrimental conditions and the issues of cost, use, and risk.

From the perspective of an appraiser, cost estimates are generally supplied by engineers or contractors. The use issues might include additional absorption or incremental holding costs. Indeed, use issues could be the most relevant in a project delay assignment, considering the time value of money and related loss of use. Risk issues generally are not relevant in this context, because there is usually no lingering risk after the delayed project is eventually completed. Nevertheless, all three elements—costs, use, and risk—should be considered in every assignment.

Market Conditions

The real estate market cycle adds complexity to issues related to project delay and the time value of money. Thus, the market value for a project on the target date and the delay date may differ for reasons completely independent of the project itself. Although the adjustment for market conditions is often referred to as a *time adjustment*, time is not the cause of the adjustment.[13] It is changes within the market itself at different points in time that are the basis for an adjustment.

Changes within the market could cause an increase or decrease or have a neutral impact on values between the target and delay dates. The graphs in Figure 1 illustrate possible market trends and their potential effects on value.

Valuation Applications

Just as there are a variety of project delay scenarios, there are also varied methodologies to measure the impact, if any, that project delays have on value. Indeed, there is no single method for analyzing the impact of delays on construction work.[14] The methodology employed should reflect the individual characteristics of the assignment. When analyzing a project delay case, the primary considerations are incremental costs, loss of use, and market conditions.

Typically a contractor or engineer computes any incremental costs or savings as a result of the delay, leaving any loss of use or market conditions adjustments to valuation experts. The following are examples of different delay situations and valuation methodologies to compute loss of use and market conditions adjustments.

Construction Delay Case

With a typical construction delay case, the calculation may be relatively straightforward. If a setback causes a 60-day delay in a $1,000,000 project, and the appropriate return is 12%, then the costs of the delay could be estimated as follows:

$$\$1{,}000{,}000 \text{ at } 60 \text{ days at } 12\% = \$20{,}000$$
$$\$1{,}000{,}000 \times (2/12) \times 0.12 = \$20{,}000$$

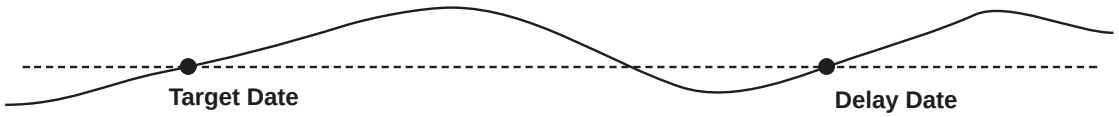
This amount reflects the time value of money and the property owner attaining use of the property 60 days later than the target date. In this case, market conditions are level and thus have nominal effect; when the delay is longer and market conditions are relevant, however, they should also be analyzed. More complex construction delay cases may also include an analysis of absorption costs and market trends.

10. Jamal Al Duaij, Tareq Awida, and A. E. Kollarayam, "Performing Value Analysis on Construction Project Variation Orders," *Cost Engineering* 49, no. 6 (June 2007): 23–27.
11. Warren, Gorham, and Lamont, Inc., "Appraiser's Liability for Mistakes," *The Mortgage and Executive Report 12, no. 2* (April 1, 1979), reprinted in "Commentary," *The Real Estate Appraiser and Analyst* (November–December 1979): 10.
12. See Randall Bell, *Real Estate Damages*, 2nd ed. (Chicago: Appraisal Institute, 2008) and Appraisal Standards Board, Advisory Opinion 9, "The Appraisal of Real Estate That May Be Impacted By Environmental Contamination," in *The Uniform Standards of Professional Practice* (Washington, DC: Appraisal Foundation).
13. Appraisal Institute, *The Appraisal of Real Estate*, 13th ed. (Chicago: Appraisal Institute, 2008), 333.
14. David W. Bordoli and Andrew N. Baldwin, "A Methodology for Assessing Construction Project Delays," *Construction Management and Economics* 16, no. 3 (1998): 327–337.

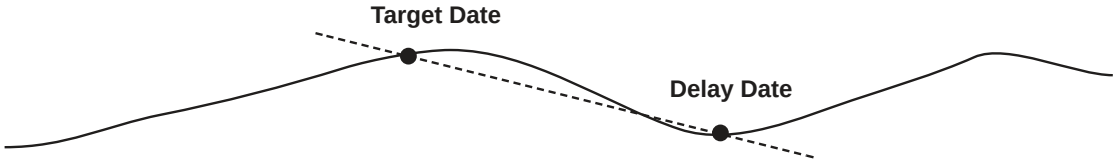
Table 1 Detrimental Conditions Matrix

	Assessment	Repair	Ongoing
Cost	Costs to assess the damage	Costs to repair the damage	Costs for ongoing issues
Use	Loss of use or utility while damages are assessed	Loss of use or utility while damages are repaired or remediated	Ongoing loss of use or utility
Risk	Uncertainty factor Risk prior to damages being fully assessed	Project incentive Pre-repair risks	Market resistance Post-repair risks

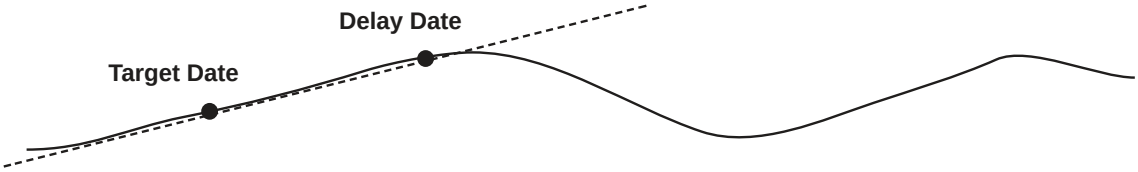
Figure 1 Impact of Market Conditions on Value



Graph 1
No Net Impact of Market Conditions on Value



Graph 2
Negative Impact of Market Conditions on Value



Graph 3
Positive Impact of Market Conditions on Value

Delay of Occupied Improved Sale

Some project delays, such as the loss of use or delay in the sale of an improved property, can be computed largely with conventional appraisal methodologies using values at the target date and the delay date. These indications of market value should also reconcile with published market trend studies. As the property is occupied, there may not be any loss of use damage issues.

As an example, consider a retail store that was scheduled to close escrow on a target date of March 14, yet the prospective buyer fails to perform on the contract. The property is leased and performing normally. Thus, there are no direct incremental costs or loss of use issues. Then, suppose that property is relisted and sells a year later. An appraisal on both dates could indicate the impact, if any, that the delay caused. It is conceivable the values are higher, lower, or similar, depending upon market conditions.

Suppose in this example, the market values are as follows:

Target date (escrow date) market value = $1,000,000

Delay date market value = $1,100,000

In this case, the delay is solely due to market conditions, which were increasing, and the project was not damaged by the delay. However, if prices had fallen between the two dates, the damages could be determined accordingly. Of course, this simple calculation may not apply to all circumstances, and other case-specific issues should be considered.

Loss of Use of Unoccupied Improved Property

In a delay case where an improved property cannot be conventionally occupied, a common valuation methodology would be to use the lease or rental rate of the property as a proxy for determining the damages caused by the loss of use.

Of course, any fixed or holding costs should also be considered in the analysis, such as taxes, insurance, management, maintenance, or utilities. With an income-producing property, the generated revenues may offset any such fixed or holding costs. While fixed expenses should certainly be deducted from the rents, a question arises as to the inclusion or exclusion of variable expenses. As a rule of thumb, it would be impractical to consider variable costs for shorter delays as compared to longer delays.[15] What constitutes a longer or shorter delay depends on the practicality of eliminating and later reinstituting variable costs.

As an example, suppose a house is discovered to have a construction defect whereby the property must be vacated while repairs are underway. In terms of use and occupancy, the damages could be benchmarked to the rental rate for the property. In other words, the damages would be equivalent to the cost of renting a comparable, substitute property. In this example, the repairs will take 7 months and the rental rate of the property is $2,600 per month, thus the use damages would be computed as follows:

$$7 \text{ months} \times \$2{,}600/\text{month} = \$18{,}200$$

Of course, this is only a part of the overall equation of damages, as costs and risks must also be considered. In this example, market conditions are not relevant as the scenario involves only a temporary loss of use, not a sale.

Loss or Delay of Land Use

Delays related to vacant land can often be computed by ground lease valuation methodologies. Ground rent is the amount paid for the right to use and occupy land according to the terms of a ground lease. It can be used in estimating the value of the landowner's interest in the land, i.e., the leased fee interest.[16] A vacant parcel of land that is slated for development may not generate any income, and may have considerable holding costs that cannot be offset.

As an example, consider a vacant parcel of land that was in escrow when an area-wide flood reveals that a nearby property owner illegally graded his property and damaged the local drainage systems. As a consequence of the floods and the risks to the property, the prospective buyer backs out of the escrow. Suppose that engineers assess the underlying grading problems, and the project delay is one year.

15. Orell C. Anderson and Edward B. Gentilcore, "A View from the Ground Up: Calculating Damages Due to Construction Project Delay," *Construct!* 15, no. 1 (Fall 2005): 1–3.

16. *The Appraisal of Real Estate*, 13th ed., 369.

In this case, the impacts of the delay may be calculated by first establishing the market value of the land and then applying a ground lease rate for the period of delay. In this calculation, the rates of return for ground-leased property need to be established.[17] Ground lease rates may inherently include both the use of the property as well as the anticipated market escalations, thus there is no need to make a separate adjustment for market conditions. However, appraisers should consider that ground lease rates usually reflect a long-term rate and in some cases another rate could be used. With relevant data, the project delay of the vacant site could be calculated as follows:

Land market value		$1,000,000
Ground lease rate	×	10%
1-Year delay	×	1
Project delay impact		$100,000

Delay of Land Development Project

With both land development projects and improved income-producing properties, the benefits include the cash flows or sales proceeds accruing to the real property over the holding or projection period.[18] However, when those streams of anticipated income are interrupted, the value can change accordingly.

In valuing real estate, the analyst could use a discounted cash flow technique that compares alternative investments and select the one that maximizes the present value of cash flows.[19] The underlying objective is to account for the entire flow of cash in and out of the project with respect to time, so that the time value of money is properly recognized in the analysis.[20]

Typical land developments and portfolios have varying and uneven portions of the project, with some portions closer to development or sale than others. Generally, market conditions are such that only so much can be absorbed at a time. When an entire project or portfolio is delayed, it tends to shift the entire project into the future. Market conditions and absorption rates may be separate and apart from the delay issue itself, yet market conditions may partially exacerbate or mitigate any damages. By creating two cash flows, one with the expected cash flow and another that incorporates the delayed cash flow, any damages from the delay can be ascertained.

Cash Flow Modeling for Project Delays

The cash flow model in Table 2 illustrates the financial effects of a land development project that is delayed under the scenarios of 5-year and 20-year forecasts. This model was computed using market trend rates of 2%, 0%, and -2%. Of course, as with any analysis, actual sale prices and land comparables could also be relevant.

The cash flow modeling in Table 2 demonstrates that project delay, expressed as a percentage of the unaffected value, correlates with inflation rates, discount rates, and length of delay; however, the term of the project has no impact. The initial discounted cash flow represents a target or baseline analysis prior to there being any delay. Then, the following cash flows are pushed back for 1, 2, 3, and 10 years, respectively. The grey area in Table 2 represents the portions computed for the five-year discounted cash flow analyses.

Table 3 shows examples of the discount to market value of a land development project where the discount rate is 22%. For example, suppose a land development project has a $10,000,000 unimpaired market value. Further suppose that the market is escalating at 2% annually and some unforeseen event delayed development for 2 years. In this case, the diminution in value due to the project delay would be approximately 30.10%, resulting in an as-is market value of approximately $7,000,000. If the delay is 10 years, then the diminution in value would be 83.31%, and the resulting as-is value would be approximately $1,700,000.

As this cash flow modeling illustrates, taking a land development project and pushing the development back just one year has a very significant impact on the value. This model assumes that all expenses are variable in nature, but in a case where there are fixed expenses the damages would actually be greater.

Conclusion

Project delays and loss of use can have significant financial consequences. Although there are

17. Chris Carneghi, "Determining Ground-Lease Rental Rates," *The Appraisal Journal* (April 1994): 256–263.

18. *The Appraisal of Real Estate*, 13th ed., 456.

19. James H. Burton, *Evolution of the Income Approach* (Chicago: American Institute of Real Estate Appraisers, 1982), 238.

20. Charles B. Akerson, *Capitalization Theory and Techniques Study Guide*, 3rd ed. (Chicago: Appraisal Institute, 2009), 129.

Table 2 Cash Flow Analysis with Project Delays

Project Delay Analysis

Baseline Cashflow		Annual Period																				Delay Phase				
Year		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Revenue:																										
Parcels Sold		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Parcel Price (Inflation)	**2.0%**	$ 40,000	$40,800	$41,616	$42,448	$43,297	$44,163	$45,046	$45,947	$46,866	$47,804	$48,760	$49,735	$50,730	$51,744	$52,779	$53,835	$54,911	$56,010	$57,130	$58,272	$59,438	$60,627	$61,839	$63,076	$64,337
Gross Sales Income		480,000	489,600	499,392	509,380	519,567	529,959	540,558	551,369	562,397	573,644	585,117	596,820	608,756	620,931	633,350	646,017	658,937	672,116	685,558	699,269	713,255	727,520	742,070	756,912	772,050
Expenses:		410,000	418,200	426,564	435,095	443,797	452,673	461,727	470,961	480,380	489,988	499,788	509,783	519,979	530,379	540,986	551,806	562,842	574,099	585,581	597,293	609,238	621,423	633,852	646,529	659,459
Net Proceeds		**70,000**	**71,400**	**72,828**	**74,285**	**75,770**	**77,286**	**78,831**	**80,408**	**82,016**	**83,656**	**85,330**	**87,036**	**88,777**	**90,552**	**92,364**	**94,211**	**96,095**	**98,017**	**99,977**	**101,977**	**104,016**	**106,097**	**108,219**	**110,383**	**112,591**
Present Value Factor	**20.0%**	**0.83333**	**0.69444**	**0.57870**	**0.48225**	**0.40188**	**0.33490**	**0.27908**	**0.23257**	**0.19381**	**0.16151**	**0.13459**	**0.11216**	**0.09346**	**0.07789**	**0.06491**	**0.05409**	**0.04507**	**0.03756**	**0.03130**	**0.02608**	**0.02174**	**0.01811**	**0.01509**	**0.01258**	**0.01048**
No Project Delay		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
Net Proceeds		70,000	71,400	72,828	74,285	75,770	77,286	78,831	80,408	82,016	83,656	85,330	87,036	88,777	90,552	92,364	94,211	96,095	98,017	99,977	101,977					
Present Value Per Period		58,333	49,583	42,146	35,824	30,450	25,883	22,000	18,700	15,895	13,511	11,484	9,762	8,297	7,053	5,995	5,096	4,331	3,682	3,129	2,660					
5-Year Land Value	**216,337**																									
5-Year Discount	**0.0%**																									
20-Year Land Value	**373,816**																									
20-Year Discount	**0.0%**																									
One-Year Project Delay		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21				
Net Proceeds		0	$71,400	$72,828	$74,285	$75,770	$77,286	$78,831	$80,408	$82,016	$83,656	$85,330	$87,036	$88,777	$90,552	$92,364	$94,211	$96,095	$98,017	$99,977	$101,977	$104,016				
Present Value Per Period		-	49,583	42,146	35,824	30,450	25,883	22,000	18,700	15,895	13,511	11,484	9,762	8,297	7,053	5,995	5,096	4,331	3,682	3,129	2,660	2,261				
5-Year Land Value	**183,886**																									
5-Year Discount	**15.00%**																									
20-Year Land Value	**$317,743**																									
20-Year Discount	**15.00%**																									
Two-Year Project Delay		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
Net Proceeds		0	0	$72,828	$74,285	$75,770	$77,286	$78,831	$80,408	$82,016	$83,656	$85,330	$87,036	$88,777	$90,552	$92,364	$94,211	$96,095	$98,017	$99,977	$101,977	$104,016	$106,097			
Present Value Per Period		-	-	42,146	35,824	30,450	25,883	22,000	18,700	15,895	13,511	11,484	9,762	8,297	7,053	5,995	5,096	4,331	3,682	3,129	2,660	2,261	1,922			
5-Year Land Value	**156,303**																									
5-Year Discount	**27.75%**																									
20-Year Land Value	**$270,082**																									
20-Year Discount	**27.75%**																									
Three-Year Project Delay		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
Net Proceeds		-	-	-	$74,285	$75,770	$77,286	$78,831	$80,408	$82,016	$83,656	$85,330	$87,036	$88,777	$90,552	$92,364	$94,211	$96,095	$98,017	$99,977	$101,977	$104,016	$106,097	$108,219		
Present Value Per Period		-	-	-	35,824	30,450	25,883	22,000	18,700	15,895	13,511	11,484	9,762	8,297	7,053	5,995	5,096	4,331	3,682	3,129	2,660	2,261	1,922	1,634		
5-Year Land Value	**132,858**																									
5-Year Discount	**38.59%**																									
20-Year Land Value	**$229,570**																									
20-Year Discount	**38.59%**																									
Ten-Year Project Delay		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Net Proceeds		-	-	-	-	-	-	-	-	-	-	$85,330	$87,036	$88,777	$90,552	$92,364	$94,211	$96,095	$98,017	$99,977	$101,977	$104,016	$106,097	$108,219	$110,383	$112,591
Present Value Per Period		-	-	-	-	-	-	-	-	-	-	11,484	9,762	8,297	7,053	5,995	5,096	4,331	3,682	3,129	2,660	2,261	1,922	1,634	1,389	1,180
5-Year Land Value	**42,591**																									
5-Year Discount	**80.31%**																									
20-Year Land Value	**$73,595**																									
20-Year Discount	**80.31%**																									

Table 3 Impact of Delay on a Land Development Project, Percentage Loss of Unimpaired Market Value

Annual Market Change	−2%	0%	2%
1-Year Delay, % loss	−19.67%	−18.03%	−16.39%
2-Year Delay, % loss	−35.47%	−32.81%	−30.10%
3-Year Delay, % loss	−48.17%	−44.93%	−41.56%
10-Year Delay, % loss	−88.81%	−86.31%	−83.31%

many factors to consider, the three primary factors are any incremental costs, the loss of use, and market conditions.

A variety of factors can cause delays with respect to sales, leases, construction, or the launch of initial construction in a land development project. There are a wide variety of factors that should be taken into account, including the type of project, the cause of the delay, liability issues, the length of delay, financing, and mitigating factors. Other key factors include holding costs, fixed costs, variable costs, and absorption costs. The appraiser should also reconcile issues of hindsight and foresight and how they relate to target and delay dates.

A number of valuation methodologies can be employed. For an income-producing property or a property where full utility is enjoyed, it may be appropriate to simply compare values on both the target and the delay dates.

Where the property does not generate income or provide conventional utility, other methodologies may be employed. In a construction delay case, incremental costs may be studied, including holding costs such as financing, property taxes, insurance, management, construction site maintenance, security, and utilities. Additionally, the delay of occupancy or incremental absorption costs should be considered.

Where the construction itself was delayed for a land development project, there are two primary valuation approaches. The first approach would be to apply the ground lease rate to the land value for the period of delay. Alternatively, two cash flow analyses could be developed, one reflecting the expected target construction date and the other with the delayed construction scenario.

The cash flow modeling presented in this article indicates that the diminution in value is strongly correlated with market conditions, inflation factors, discount rates, and the period of delay, and is less correlated to the term of the project.

With project delays, there are a number of variables and a number of possible outcomes that are dependent upon case-specific factors. While an involved and sometimes complex topic, determining the financial impacts of project delay or loss of use is ultimately the application of conventional valuation methodologies that apply to the specific characteristics of the assignment.

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Web Connections

Internet resources suggested by the Y. T. and Louise Lee Lum Library

AACE International—Cost Estimating Models
http://www.aacei.org/resources/costmodels.shtml

American Society of Civil Engineers—Civil Engineering Database
http://www.asce.org/knowledge-learning/Research-Tools

Marshall & Swift—Building Cost Data
http://www.marshallswift.com/ms-buildingcostdata.aspx

Misronet Construction Information Services
http://www.misronet.com/durations.htm