Supplementary Materials for

The idea marketplace: Diversity, social capital, and innovation

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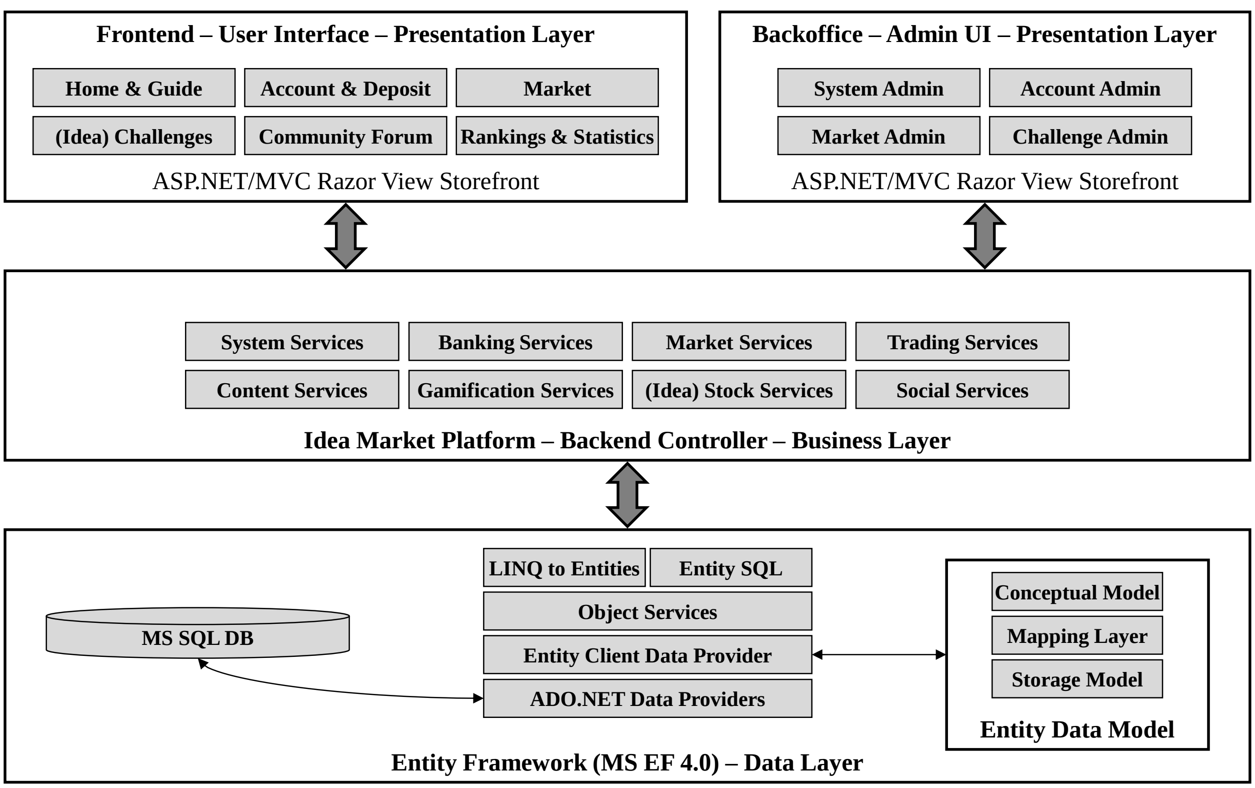
Web Appendix 1: Idea market platform

The idea market platform is built on the Microsoft ASP.NET MVC 3 architecture, using technologies such as C#, JSON, and jQuery to provide seamless functionality and user experience. To efficiently manage data operations, the platform uses Microsoft Entity Framework 4. This object-relational mapping (ORM) framework simplifies database interactions by acting as a bridge between the application code and the underlying database. The system relies on a Microsoft SQL Server database to meet various data requirements. The storefront is built using MVC Razor View for a clean and responsive design, which allows for the separation between the presentation layer (HTML markup) and the underlying logic (C# code).

Figure A1 depicts the system architecture, including the key platform-related services in the backend business layer. For example, the *content services* module facilitates content management tasks such as creating and editing idea descriptions, and maintaining version control to track changes effectively. The *market services* module manages markets on the platform, including the market maker functionality, and facilitating initial public offerings (IPOs) and auctions.

Figure A1 Idea market platform system architecture



Web Appendix 2: Calculation of closeness and eigenvector centrality

Closeness centrality

A participant j's efficient access to information is reflected by their closeness centrality, C_j, captured by the inverse of the total shortest paths from j and every other participant j' in the network (Bavelas 1950):

$$C_j = \frac{1}{\sum_{j'} d(j,j')}.$$

Eigenvector centrality

Following Bonacich's (1987) formulation, we calculate person j's eigenvector centrality, E_j, as proportional to the total eigenvector centralities of j's connections j':

$$\lambda E_j = \sum_{j'} E_{j'},$$

where λ is a proportionality factor between 0 and 1 to ensure a non-zero solution to the above equation. The equation is ultimately self-referential in that j's eigenvector centrality, E_j, depends on the eigenvector centrality of all j's connections, $E_{j'}$, whose eigenvector centrality depends on the eigenvector centrality of their connections and so on throughout the entire network.

The values of λ and E_j are derived by solving a simultaneous linear equation system in the standard eigenvector-eigenvalue formulation:

$$\lambda E = eE,$$

where E is a column vector of dimension $[J \times 1]$ that consists of the eigenvector centrality of all J participants in the network. The symmetric adjacency matrix e of dimension $[J \times J]$ captures all connections in the network: its diagonal elements are all zeros and an off-diagonal element jj' is 1 if j is connected to j' and 0 otherwise. Using the matrix algebra language, the parameter λ is essentially the largest eigenvalue associated with the adjacency matrix e, and E is its corresponding eigenvector. Readers interested in the standard eigenvector-eigenvalue formulation may refer to Namboodiri (1984) or Abadir and Magnus (2005) for a step-by-step derivation. We also provide a stylized example of this derivation next.

Stylized derivation of eigenvector centrality

Let e be an $n \times n$ matrix. And λ is an eigenvalue of e if there exists a non-zero vector v such that

$$ev = v.$$

In this case, vector v (or PE in our context) is called an eigenvector of e corresponding to λ. We can rewrite the condition $ev = v$ as follows:

$$(e - I)v = 0,$$

where I is the $n \times n$ identity matrix. For a non-zero vector v to satisfy this equation, $e - I$ must not be invertible. That is, the determinant of $e - I$ must equal 0. Call $p(\lambda) = \det(e - \lambda I)$ the characteristic polynomial p of e. The eigenvalues of e are the roots of the characteristic polynomial of e.

For example, let $e = \begin{bmatrix} 2 & -4 \\ -1 & -1 \end{bmatrix}$,

then $p(\lambda) = \det\begin{bmatrix} 2-\lambda & -4 \\ -1 & -1-\lambda \end{bmatrix} = (2-\lambda)(-1-\lambda) - (-4)(-1) = \lambda^2 - \lambda - 6 = (\lambda - 3)(\lambda + 2)$.

Thus, $\lambda_1 = 3$ and $\lambda_2 = -2$ are the eigenvalues of e.

To find the eigenvectors corresponding to these eigenvalues, solve the system of linear equations given by $(e - \lambda I)v = 0$. For example, to solve for the eigenvectors corresponding to $\lambda_1 = 3$, let $v = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$. Then $(e - 3I)v = 0$ gives us $\begin{bmatrix} 2-3 & -4 \\ -1 & -1-3 \end{bmatrix}\begin{bmatrix} v_1 \\ v_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$, from which we obtain the duplicate equations

$$-v_1 - 4v_2 = 0$$

$$-v_1 - 4v_2 = 0$$

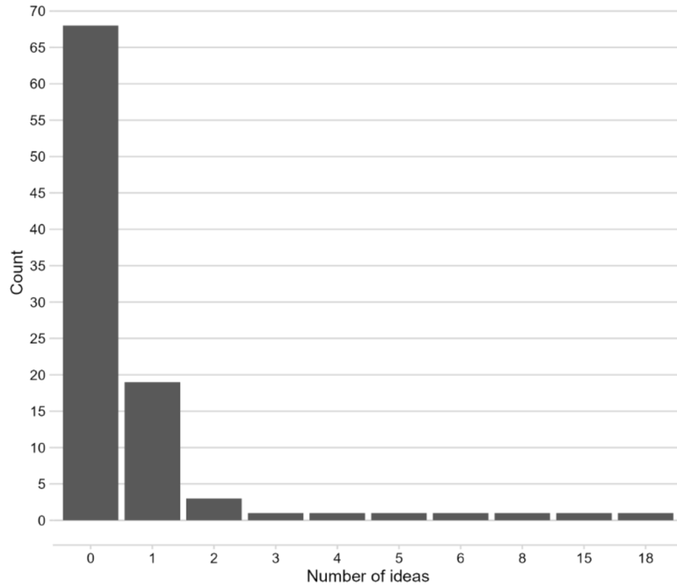
If we let $v_2 = t$, then $v_1 = -4t$. All eigenvectors corresponding to $\lambda_1 = 3$ are multiples of $\begin{bmatrix} -4 \\ 1 \end{bmatrix}$, and thus the eigen-space corresponding to $\lambda_1 = 3$ is given by the span of $\begin{bmatrix} -4 \\ 1 \end{bmatrix}$.

Web Appendix 3: Idea rankings (ordered probit model) using only Study 2 data

	Initial Participant Evaluation: Ranking at End of Offering		**Final Participant Evaluation: Ranking at End of Trading**		**Expert Evaluation: Ranking at End of Payout**	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−.001	(.000)	−.001	(.000)	−.000	(.000)
AbstractLength	−.003	(.002)	−.003	(.002)	.001	(.002)
Preview	−1.173***	(.394)	−.881**	(.392)	−.431	(.384)
NumImages	0.338	(.328)	.274	(.303)	.081	(.320)
HoursTillDeadline	.015***	(.004)	.015***	(.004)	.004	(.004)
NumUserRatings	−.011	(.116)	−.005	(.114)	.088	(.116)
NumDiscussionThreads	−.341**	(.133)	−.366***	(.136)	.015	(.128)
Participant Factors						
Idea Generator						
Generator_NumIdeasGenerated	−.057*	(.032)	−.061*	(.032)	−.025	(.029)
Generator_PriorKnowledge	−.597***	(.156)	−.537***	(.156)	−.231	(.146)
Generator_IsEmployee	.905	(.662)	1.592**	(.723)	1.471**	(.674)
Generator_Eigenvector	−2.777	(6.210)	−9.328	(7.105)	−8.449	(6.225)
Generator_Closeness	−3.827	(2.705)	−5.329*	(2.868)	−5.194**	(2.585)
Idea Traders						
Traders_AvgEigenvector	−10.366	(16.505)	3.090	(6.892)	−1.703	(16.644)
Traders_AvgCloseness	−4.831*	(2.549)	−4.944**	(2.520)	4.566*	(2.586)
LR Chi2	46.873		44.478		13.898	
Pseudo R2	.115		.112		.037	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 71 ideas.

Web Appendix 4: Histogram of the number of ideas generated



Web Appendix 5: Correlations among variables

Ranking at End of Offering

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) DescriptionLength	1.000													
(2) AbstractLength	0.113	1.000												
(3) Preview	0.357*	0.419*	1.000											
(4) NumImages	0.224*	0.387*	0.316*	1.000										
(5) HoursTillDeadline	0.323*	0.179	0.305*	0.044	1.000									
(6) NumUserRatings	0.490*	0.083	0.249*	-0.084	0.464*	1.000								
(7) NumDiscussionThreads	0.425*	0.093	0.232*	-0.093	0.546*	0.609*	1.000							
(8) Generator_NumIdeasGenerated	-0.172	-0.141	-0.200	-0.120	-0.401*	-0.282*	-0.403*	1.000						
(9) Generator_PriorKnowledge	-0.092	-0.240*	-0.177	-0.231*	0.131	0.184	0.263*	-0.097	1.000					
(10) Generator_IsEmployee	0.305*	-0.168	0.096	-0.101	0.243*	0.294*	0.358*	-0.519*	0.251*	1.000				
(11) Generator_Eigenvector	0.284*	-0.213	0.138	-0.046	0.356*	0.282*	0.234*	-0.479*	0.157	0.784*	1.000			
(12) Generator_Closeness	0.258*	0.033	0.274*	0.070	0.415*	0.284*	0.377*	-0.756*	0.039	0.722*	0.650*	1.000		
(13) Traders_AvgEigenvector	0.520*	0.051	0.280*	0.060	0.409*	0.534*	0.341*	-0.449*	0.159	0.643*	0.651*	0.523*	1.000	
(14) Traders_AvgCloseness	0.378*	0.119	0.221*	0.116	0.386*	0.455*	0.296*	-0.481*	0.229*	0.428*	0.506*	0.518*	0.776*	1.000

* $p < .05$, N = 84 ideas.

Web Appendix 6a: Idea rankings: Analyses with one centrality at a time

As documented in the literature (e.g., Wasserman and Faust 1994; Dekker et al. 2007), the eigenvector centrality and closeness centrality are correlated (Web Appendix 5). We hence re-conduct the same analyses on the idea quality rankings (Web Appendix 6a) and engagement rankings (Web Appendix 6b) using only a single centrality at a time. The findings remain consistent: In support of H1, the ideas ranked higher at each stage are generated by those participants with more efficient resource access (higher closeness centrality: Table A6a-1), but not by those with higher status (higher eigenvector centrality: Table A6a-2).

Table A6a-1 Idea quality rankings—only with closeness centrality

	Initial Participant Evaluation: Ranking at End of Offering		**Final Participant Evaluation: Ranking at End of Trading**		**Expert Evaluation: Ranking at End of Payout**	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−.001	(.000)	−.001	(.000)	−.000	(.000)
AbstractLength	−.002	(.002)	−.002	(.002)	.001	(.002)
Preview	−.616**	(.298)	−.629**	(.295)	−.421	(.295)
NumImages	.238	(.265)	.344	(.268)	.147	(.262)
HoursTillDeadline	.013***	(.003)	.012***	(.003)	.005	(.003)
NumUserRatings	.082	(.076)	−.025	(.077)	−.042	(.076)
NumDiscussionThreads	−.352***	(.115)	−.262**	(.109)	.041	(.110)
Participant Factors						
Idea Generator						
Generator_NumIdeasGenerated	−.065**	(.030)	−.050*	(.029)	−.024	(.028)
Generator_PriorKnowledge	−.351***	(.126)	−.311**	(.124)	−.157	(.122)
Generator_IsEmployee	1.252**	(.522)	1.211**	(.488)	.707	(.516)
Generator_Closeness	**−5.305****	**(2.550)**	**−5.142****	**(2.599)**	**−4.971****	**(2.461)**
Idea Traders						
Traders_AvgEigenvector	−7.306	(6.009)	−5.228	(5.126)	−12.932**	(6.017)
Traders_AvgCloseness	−4.344*	(2.338)	−3.733	(2.386)	4.237*	(2.356)
LR Chi2	51.167		48.596		18.977	
Pseudo R2	.105		.100		.041	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 84 ideas.

Table A6a-2 Idea quality rankings—only with eigenvector centrality

	Initial Participant Evaluation: Ranking at End of Offering		Final Participant Evaluation: Ranking at End of Trading		Expert Evaluation: Ranking at End of Payout	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−0.001	(0.000)	−0.001	(0.000)	−0.000	(0.000)
AbstractLength	−0.002	(0.002)	−0.002	(0.002)	0.001	(0.002)
Preview	−0.702**	(0.294)	−0.684**	(0.292)	−0.492*	(0.291)
NumImages	0.247	(0.265)	0.348	(0.267)	0.152	(0.262)
HoursTillDeadline	0.012***	(0.003)	0.012***	(0.003)	0.005	(0.003)
NumUserRatings	0.084	(0.076)	−0.006	(0.076)	−0.040	(0.076)
NumDiscussionThreads	−0.371***	(0.117)	−0.318***	(0.114)	0.004	(0.112)
Participant Factors						
Idea Generator						
Generator_NumIdeasGenerated	−0.031	(0.024)	−0.020	(0.024)	0.005	(0.023)
Generator_PriorKnowledge	−0.283**	(0.119)	−0.256**	(0.117)	−0.106	(0.116)
Generator_IsEmployee	0.959*	(0.512)	1.105**	(0.498)	0.612	(0.508)
Generator_Eigenvector	**−4.943**	**(3.952)**	**−6.406**	**(4.131)**	**−7.154***	**(3.963)**
Idea Traders						
Traders_AvgEigenvector	−3.254	(5.812)	−1.550	(5.154)	−8.464	(5.745)
Traders_AvgCloseness	−5.441**	(2.248)	−5.053**	(2.251)	3.172	(2.223)
LR Chi2	48.337		47.037		18.147	
Pseudo R2	.099		.097		.039	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 84 ideas.

Web Appendix 6b: Engagement rankings: Analyses with one centrality at a time

In support of H2a-c, participants with higher status (higher eigenvector centrality) engage more, producing more ideas, discussion threads, and comments (see Table A6b-1). In contrast, access network resources (closeness centrality: Table A6b-2) does not show any significant effect.

Table 6b-1 Engagement rankings—only with eigenvector centrality

	# Ideas Generated		**# Discussions Threads**		**# Comments**	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−.002***	(.000)	.000	(.000)	.000	(.000)
AbstractLength	−.008***	(.002)	−.005***	(.002)	−.005**	(.002)
Preview	−.715	(.531)	−.981*	(.512)	−.812	(.505)
NumImages	−.229	(.735)	.087	(.771)	.121	(.765)
Participant Factors						
IsEmployee	−.080	(.430)	−.056	(.416)	.153	(.419)
PriorKnowledge	−.086	(.079)	−.062	(.076)	−.089	(.075)
Eigenvector	**−8.046****	**(3.129)**	**−6.716****	**(3.006)**	**−7.401****	**(3.014)**
LR Chi2	97.818		36.705		34.889	
Pseudo R2	.326		.130		.101	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 93 participants.

Table A6b-2 Engagement rankings—only with closeness centrality

	# Ideas Generated		**# Discussions Threads**		**# Comments**	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−0.002***	(0.000)	0.000	(0.000)	−0.000	(0.000)
AbstractLength	−0.007***	(0.002)	−0.004**	(0.002)	−0.004*	(0.002)
Preview	−0.786	(0.529)	−0.987*	(0.511)	−0.816	(0.503)
NumImages	−0.467	(0.734)	−0.136	(0.765)	−0.090	(0.757)
Participant Factors						
IsEmployee	−0.939**	(0.445)	−0.681	(0.426)	−0.445	(0.416)
PriorKnowledge	−0.080	(0.077)	−0.060	(0.075)	−0.088	(0.074)
Closeness	**0.085**	**(2.379)**	**−0.647**	**(2.287)**	**−1.409**	**(2.240)**
LR Chi2	91.011		31.706		29.130	
Pseudo R2	.303		.113		.084	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 93 participants.

Web Appendix 7a: Idea rankings with interaction between centralities

	Initial Participant Evaluation: Ranking at End of Offering		Final Participant Evaluation: Ranking at End of Trading		Expert Evaluation: Ranking at End of Payout	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	−.001**	(.000)	−.001*	(.000)	−.000	(.000)
AbstractLength	−.002	(.002)	−.002	(.002)	.000	(.002)
Preview	−.669**	(.303)	−.620**	(.299)	−.400	(.298)
NumImages	.347	(.272)	.400	(.274)	.185	(.268)
HoursTillDeadline	.014***	(.003)	.013***	(.003)	.006**	(.003)
NumUserRatings	.032	(.083)	−.050	(.083)	−.054	(.082)
NumDiscussionThreads	−.322***	(.125)	−.276**	(.122)	.017	(.120)
Participant Factors						
Idea Generator						
Generator_NumIdeasGenerated	−.059*	(.030)	−.049	(.030)	−.023	(.028)
Generator_PriorKnowledge	−.425***	(.131)	−.377***	(.131)	−.198	(.127)
Generator_IsEmployee	1.149*	(.678)	1.455**	(.670)	1.154*	(.682)
Generator_Eigenvector	52.706	(36.081)	24.097	(35.835)	6.488	(35.957)
Generator_Closeness	−4.709*	(2.585)	−4.947*	(2.644)	−4.836*	(2.495)
Generator_Eigenvector × Generator_Closeness	−216.131	(134.495)	−115.953	(133.945)	−51.221	(133.932)
Idea Traders						
Traders_AvgEigenvector	−6.473	(6.071)	−2.719	(5.311)	−12.069**	(6.045)
Traders_AvgCloseness	−4.454*	(2.373)	−3.703	(2.420)	4.795**	(2.403)
LR Chi2	55.307		51.987		22.400	
Pseudo R2	.114		.107		.049	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 84 ideas.

Web Appendix 7b: Engagement rankings with interaction between centralities

	# Ideas Generated		# Discussions Threads		# Comments	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Idea Factors						
DescriptionLength	-0.002***	(0.000)	0.000	(0.000)	-0.000	(0.000)
AbstractLength	-0.008***	(0.002)	-0.005***	(0.002)	-0.005**	(0.002)
Preview	-0.744	(0.535)	-0.989*	(0.514)	-0.814	(0.506)
NumImages	-0.310	(0.745)	0.055	(0.784)	0.118	(0.777)
Participant Factors						
IsEmployee	-0.215	(0.555)	-0.107	(0.536)	0.182	(0.531)
PriorKnowledge	-0.084	(0.079)	-0.061	(0.076)	-0.089	(0.075)
Eigenvector	-13.775	(15.889)	-8.277	(15.269)	-8.420	(15.150)
Closeness	1.520	(2.541)	0.540	(2.425)	-0.175	(2.367)
Eigenvector × Closeness	21.422	(64.055)	5.696	(61.590)	4.369	(61.049)
LR Chi2	98.398		36.776		34.898	
Pseudo R2	.328		.131		.101	

* $p < .1$, ** $p < .05$, *** $p < .01$, N = 93 participants.

References

Abadir, K. M., & Magnus, J. R. (2005). *Matrix Algebra*. Cambridge University Press.

Namboodiri, K. (1984). *Matrix Algebra: An Introduction* (Quantitative Applications in the Social Sciences). Newbury Park, California: SAGE Publications.